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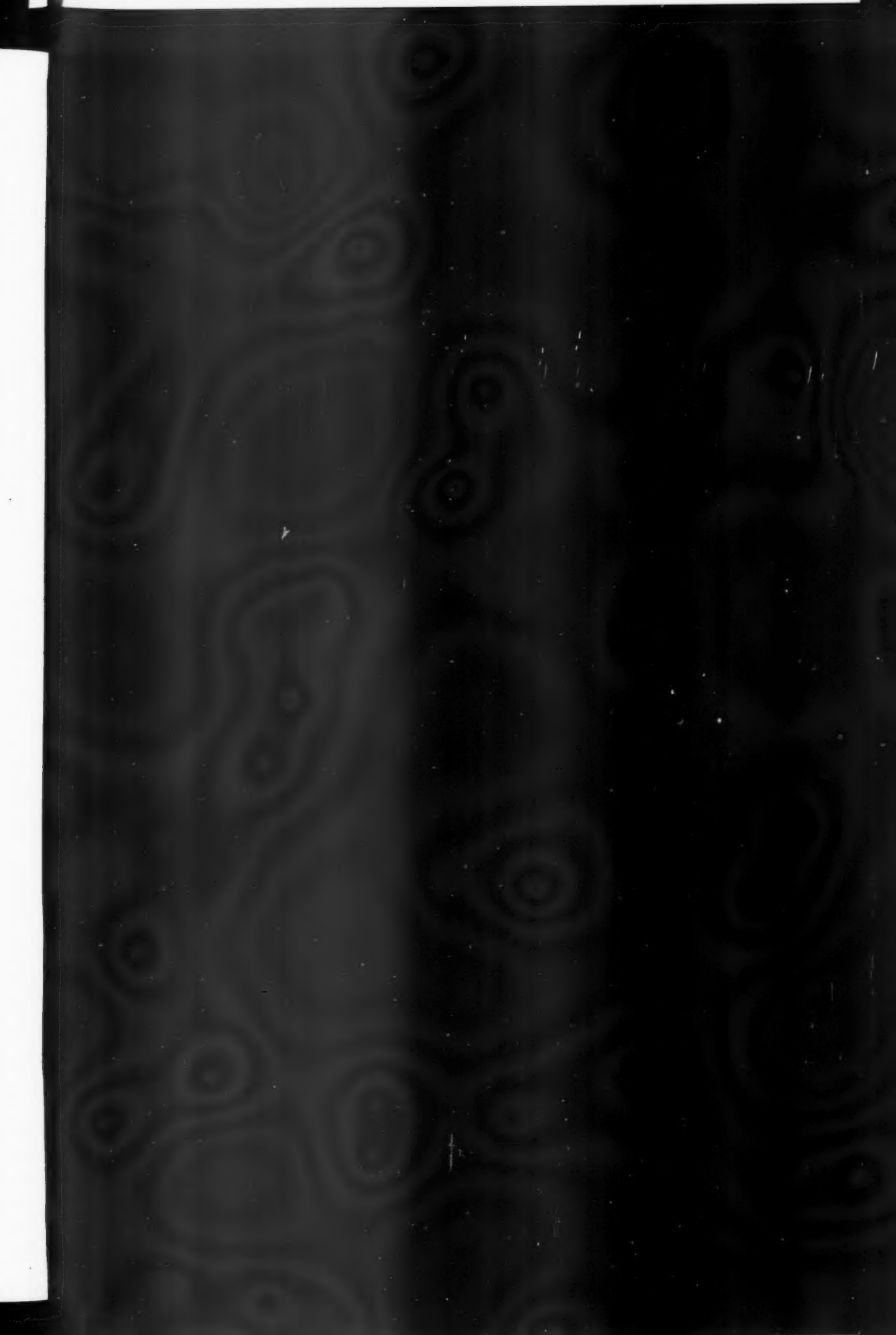

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Concerning Senile Cataract

Luther C. Peter, M.D.

SENILE cataract does not occur in old age only, but may be present in individuals of forty or fifty. These early cases are of a complicated variety and may be caused by a focal infection in some remote part of the body, such as pyorrhea, infected teeth, bad tonsils, gastrointestinal diseases, et cetera

ONE of the sad recollections of my childhood was that of my favorite grandmother, during her last years, groping her way in darkness, led by the members of her family, because of cataract. Preventable blindness is a tragedy in the life of any individual, but when it becomes the lot of those whom we love, who have reached the age of threescore and ten, it arouses within us a something which touches the heartstrings. In a much broader sense, few of us are immune to the feeling of pity for any one who must grope his or her way in darkness, when the means of prevention or aid, so abundantly present everywhere, for some reason has not been available.

It so happens that many of the human family are subject to cataract after fifty years of age. It is a common condition which most people dread, and yet, with all their fear of becoming blind, few exercise even a semblance of care in its prevention or in its arrest. There is a common belief that if it makes its appearance, the individual is doomed to blindness, or to the ordeal of an operation which he fears may destroy what little sight is left. Nothing is further from the truth, and yet every eye surgeon will bear testimony to the fact that this is the true state of mind of the average individual who has senile cataract.

Inasmuch as so many are poorly informed as to the possibilities in cataract, this communication is offered to remove some of the

misconceptions, to create an intelligent understanding as to prevention and arrest of the process, and to banish the dread of operation if such becomes necessary.

What Is Cataract?

Within the eye, back of the iris, or colored curtain, is a small round body, or disc, known as the crystalline lens. When normal, the lens is clear and allows light rays to enter the eye. Its chief function is to allow rays of light and objects to become focused upon the retina—the seeing part of the eye. With advancing years and sometimes in general constitutional diseases or in the presence of focal infections, the lens, which normally is clear as glass, becomes clouded and the condition known as "cataract" begins. When it is mature or ripe, as the laity calls it, the lens becomes grayish white. The black pupil takes on a grayish appearance, and less and less light can enter the eye. Objects become dimmed and hazy, and finally the individual can only distinguish between light and darkness. If uncomplicated by optic nerve disease or by glaucoma (hardening of the eyeball), the patient does not become totally blind because of cataract. He sees, as it were, through frosted glass. When the cataract becomes mature, the lens can be successfully removed, the proper glasses can be prescribed, and the patient can see again as other individuals.

Contrary to general belief, in the light of our present knowledge, cataract may often be prevented in its beginning; it may be arrested by suitable measures; and can be removed before it is ripe, thereby saving the patient months of incapacity.

The Causes of Cataract

A child may be born with congenital cataract. Trivial or severe blows upon the eyeball may cause traumatic cataract at any time of life. We are concerned, however, in this discussion with the type which is commonly known as senile cataract. It is a misnomer in that it does not necessarily occur in old age, but may be present in individuals of forty or fifty. These early cases, as a rule, are of a complicated variety and are due to a focal infection in some remote part of the body, such as pyorrhea, infected teeth, bad tonsils, gastrointestinal diseases, and other remote infections,

as well as to constitutional diseases. People who live in the tropics, and those who are exposed to great heat, like glass blowers, may be similarly afflicted early in life.

From fifty years on, one of the usual forms of senile cataract may develop. The causes are many, and the same individual may have multiple factors which contribute to its formation. Some of the causes may not be frank focal infections, such as those to which I have alluded, but they may be present in diluted form and act as contributory factors.

In the study of the anatomy and the physiology of the eye, one finds that the lens does not have a blood supply of its own, but draws its nutrition from other nearby structures. In advanced life the nutrition of the eye, as well as that of the body in general, suffers as compared with early life. It is quite natural, therefore, to expect a tissue, which does not have a direct blood supply, to be the first to show lack of nutrition. This is true of the crystalline lens, and its fibers, which originally were transparent, lose their clearness, and opacities begin to form. These opacities fortunately begin as a rule in the peripheral part of the lens back of the iris, and not in the center through which we see. Cataract, therefore, can be well under way, and the patient may not be conscious of any visual defect. In such cases it is only when the physician or eye surgeon uses suitable drops to dilate the pupil, that he can uncover the condition at a time when much may be done to arrest the process. When opacities appear in the center of the pupil, the individual becomes conscious of a reduction in vision, and cataract is well on its way. The natural loss of nutrition, which comes with advancing years, often is the beginning of cataract formation. It may be hastened by ill health, by focal infections, by overwork, and by neglect of general health principles.

The Influence of Defective Vision and its Neglect

A most important contributing factor is defective vision resulting from astigmatism and neglect in the use of glasses to correct such defects. All the causes which have been mentioned are potent influences in the formation of cataract, but eyestrain, of which the patient may be conscious or unconscious, probably plays a larger rôle than any individual factor which I have discussed.

Uncorrected eyestrain, even in early life, causes a low type of chronic congestion which may play a prominent part in cataract formation later in life. It is particularly important for people in their forties to use glasses to aid in reading when they find they need very good light in order to read comfortably, or when they find it difficult to look up numbers in a telephone directory. Many people take pride in feeling that they do not need glasses, but it is the pride of ignorance.

Few individuals after forty-five years of age are able to read comfortably without the aid of glasses. Many do, but they are unqualified, self-appointed judges, and many are led to continue the practice by false pride, lest the wearing of glasses betray their age. As a matter of fact, their frantic efforts to read at arm's length furnish a greater betrayal of their years and, in addition, what is of more vital importance, they are encouraging future trouble which may not readily be repaired. The laws of nature deal rather equitably with humanity, and the age of forty-five, as a rule, marks a period in the lives of all when glasses are needed for close work. The few who elect themselves to be the exceptions, if put to proper tests, could not qualify as a favored group.

Can Cataract Be Prevented?

It is quite in order to ask, "Can cataract be prevented?" The answer is emphatically yes, in many instances. One hears much of periodic health examinations. Life insurance companies find it so important that they offer such periodic examinations free to all their insured. If it is profitable to the companies, how much more worth while should it be to the people who are insured; and if it is profitable to those who carry policies, it should be and is equally valuable to those who are not insured and who, so to speak, carry their own risks. In these instances, however, the examinations fall short of thorough eye studies. The eye is an early index to many constitutional and to cardiovascular diseases, even before they are generally recognized. Such study, if thorough, would uncover the earliest evidence of cataract. If the eyes were examined every third year after the age of forty, many general conditions and many cases of cataract in the earliest stages would be recognized, and treatment might prevent their further development.

Long before the age of forty, if the individual is troubled with red lids, defective vision, unexplainable headaches which develop during the day, or drowsiness on reading or doing close work, an eye physician should be consulted for a thorough study of the eyes. After forty, a comprehensive study should be made without regard for the presence or absence of symptoms. Such procedures would offer to the individual a health insurance policy from an eye, as well as from a health, standpoint, which would pay worth while dividends, with comparatively low premiums. Cataract is most insidious in onset, and its early recognition is of much value in the matter of treatment.

The study, however, should be carried further, and general periodic health examinations should be made with a view to uncover bad teeth, infected tonsils, gastrointestinal toxemias, and other remote foci of infection, as well as constitutional diseases, all of which may contribute to the formation of cataract. From many patients who have cataract, especially of the complicated variety, one can elicit the history of joint pains, stiffness, or frank arthritis, and the eye and joint diseases are found to be caused by the same etiologic factor.

Can Cataract Be Arrested?

Until recent years the layman dreaded to hear the verdict pronounced, "You have cataract." It was tantamount to blindness eventually, or the expense and ordeal of a series of operations for its removal. The medical profession offered little more than, "I can change your glasses, and when the cataract is mature, it can be removed." Such teaching is not unlike telling a patient suffering from pulmonary tuberculosis, or any other chronic illness, that his case is serious and the prognosis or outlook is hopeless. The march of progress in medicine now permits us to say, "You have such and such a disease, but if you follow approved and tried medical advice, you may recover." The instances of chronic Bright's disease and diabetes are even more to the point. Skilled medical guidance carries the victims of these diseases through years of usefulness, and such patients often die, not from these causes, but from some intercurrent acute illness.

Much can be done to arrest the development of cataract.

The eye physician of today, who is recognized as a modern and up-to-date specialist, will do much more than prescribe glasses for his cataract patient and await the time when the cataract can be removed by surgery. He will make a careful study of the eye and, in addition, will study, with the aid of other skillful physicians, the entire body, to uncover the cause of the cataract. If focal infections can be eliminated, and constitutional diseases can be brought under control, these factors, which often contribute to cataract formation, cease to elaborate their poisons and toxins.

A third step is necessary, however, in arresting the development of cataract. This consists of local methods of treatment which tend to improve the general nutrition of the eyes. These local measures are technical and vary with the physician's training and experience. All, however, are administered to obtain the same end, namely, an improvement in the nutrition of the eye tissues.

A fourth and final step in arrest of cataract formation is the advice given to patients by eye physicians to save the eyes from unnecessary strain and abuse. It is not only necessary to prescribe glasses with care and precision, but the patient should be instructed in the proper use of his eyes with good illumination, etc.

In the experience of many patients, there may be some who have not been treated as outlined above. Those, however, whose good fortune it may be to fall into the hands of physicians who are well trained in their art will have the satisfaction of knowing that most cases of cataract can be retarded, and in many instances patients can be carried through life without the necessity for operation. The important factor is treatment in the early stages of the disease.

If the patient waits until sight is impaired before consulting an eye physician, or if the proper effort is not made to find and eliminate the cause or contributing factors, operation becomes inevitable. Waiting until vision is reduced, or until the reduction is evident to the patient, involves a much greater risk. A diagnosis of cataract is often made by laymen and by physicians who are untrained in the recognition of eye diseases, when the condition really is glaucoma (hardening of the eyeball). This is a serious mistake. Glaucoma, like cataract, if recognized early, yields to proper treatment; but if it is recognized only after vision is much reduced, the danger of ultimate blindness is great. A

careful periodic health examination of the eyes, therefore, is of the utmost value to patients after forty years of age.

Modern Methods of Surgery in Cataract

As stated above, many patients call upon the eye surgeon when vision is much reduced and surgery is necessary. Those who are brought face to face with the question of surgery ask many questions as to the probable outcome. Most important in these logical questions may be found the following: What risk am I taking in losing what sight I have? What are my chances of continuing my occupation after operation? Am I too old for operation? Should both eyes be operated on? How long must I be in the hospital? Must I wait indefinitely until the cataract is mature (ripe)?

What is the Risk?—During the past century, eye surgeons the world over have studied and improved the simple but somewhat crude procedures of years ago, until today the answer to the first question is most satisfactory. With modern precautions and safeguards, and modern technique, few eyes are lost even in the hands of those who operate infrequently. Naturally, refinements in the ultimate results will vary with the operator and the method of extraction which is employed. The cataract operation is probably the most delicate in all surgery, and the final results will depend upon two factors: the first is the surgeon, and the second is the patient. The average seasoned surgeon is a safe operator. Much, however, depends upon the patient. A co-operative patient as a rule, obtains excellent results in the hands of an average surgeon. A non-co-operative patient may mar the best efforts of an experienced surgeon. Through the modern methods of preparation, the patient enters the operating room with confidence and trust in the operator's ability, and co-operates to the fullest extent with the happiest of results.

Chances of Recovery.—What are the patients' chances of recovering sight which will enable them to continue their occupations? This is a question of much concern—a vital one in many instances. The answer today is, "Their chances are excellent." Much depends upon the method of operating, to which reference will be made. As a rule, most occupations can be resumed after recovery from operation. The refinements of surgical technique

are such that visual results are excellent; in fact, in many individuals, as good as the vision before cataract developed. The pleasure of reading and working at the near point, and the prospects of again following a gainful occupation are worth while goals towards which patients, plunged into semidarkness and incapacity, may look forward with hope and confidence.

Age in Cataract Operation.—The question of age is equally reassuring. Age, as a rule, is not a barrier to cataract extraction. There is a little more risk in operating upon a patient of eighty than upon one in the sixth decade. This risk depends largely upon the heart and vascular system. With the care which is usually exercised by the modern surgeon, old age becomes a serious problem only in the exceptional case.

Operation on Both Eyes?—Shall both eyes be operated upon? Each case becomes a law unto itself, and the surgeon in charge renders the decision for each individual case. In a general way, both eyes should be operated upon in patients under seventy-five. In older patients, one good eye may be sufficient for the patient's needs.

If one eye is good, shall the cataractous eye be subjected to operation? As a rule, if one eye is good, and cataract is mature in the other eye, the cataract should be extracted promptly. An overripe cataract is a menace which cannot safely be left to chance. It should be removed.

Hospitalization in Cataract Operation.—The last questions, as to the length of stay in a hospital and the immaturity of the cataract, may be answered together. They involve the problem of the most approved method of extraction, upon which the layman should be informed.

Methods of Cataract Operation

In the beginning of this communication, I referred to the progress made in the refinements of cataract extraction. In no department of surgery has progress been greater. In order that the reader can better understand the difference between the old and the new methods as now practiced, a brief description is necessary. The lens is surrounded by a capsule or covering. In the older methods of surgery, after opening the eye and enlarging the pupil by an

iridectomy, the capsule is incised, or a part of the capsule is removed by sharp forceps, after which the cataract is expressed from its capsule and through the corneal wound. If the cataract is not mature, soft lens particles are often left in the eye. The retained particles, inflammatory exudate, and remaining lens capsule may not leave a clear pupillary space. A needling or discission operation then becomes necessary, in order that a clear opening may be made through this secondary cataract formation, so that the patient can see. Those who do a two-stage operation, first, do an iridectomy; second, express the cataract; and as a third stage, if necessary, do a needling operation.

In the newer methods, the lens capsule is not broken, but the capsule and cataract are lifted out of the eye as one body. This leaves a clear black pupil, and a needling is unnecessary. To enhance the value of this type of operation, the pupil is not enlarged, but left round as it was before operation. Two methods of extraction are now practiced. Either the lens is lifted out by smooth capsule forceps, or the lens is grasped by a small vacuum cup and is lifted from the eye in its capsule by suction. In either form, the operation is known as "cataract extraction in capsule." The older method is known as "expression operation," or sometimes is called "extraction with capsulotomy," meaning thereby that the capsule is ruptured, the lens is expressed through the opening in the capsule, but part of the capsule is left in the eye.

In the early days, a two-stage procedure was advised, and in some instances, a forced third stage was necessarily added to the technique. This was thought and even now is believed by some, who have had no experience with the newer technique, to offer an element of safety to the extraction which a one-stage operation might not possess. To be admitted to a hospital two or three times in order to obtain good results in a single eye, adds unnecessary expense, tax upon the general system, fear, and apprehension to a patient which modern surgery, in the hands of the experienced, has removed. There are rare instances in which a two-stage operation may be necessary, but in all other instances, a single operation, barring unforeseen accidents, is sufficient. For such operation, properly performed, nine to ten days is an average period for hospitalization.

Extraction in capsule is not new. It dates back well into the last century, but the safeguards now available, and improvement in technique, offer the prospects of more rapid convalescence and better vision than the usual expression operation. It, furthermore, eliminates many of the complications incident to the older and more frequently practiced method. If, in addition to this modern technique, a round pupil is preserved, the ultimate cosmetic results are much better, the patient is spared the annoyance of light glare, and vision is better and more comfortable than that which can be obtained by the older method.

When is Cataract Ready for Operation?

A final question is frequently asked, "Is my cataract ripe and ready for operation?" If the vision is good in one eye, so that the patient can carry on, this question is given little thought. In former years and even today, those who practice the older method of operating await full maturity before they advise surgery. Many a man is thereby deprived of the means of earning a living, and all cataract patients so treated grope in semidarkness while awaiting maturity. Modern methods of surgery make this unnecessary. It is possible to remove a cataractous lens successfully when the patient reaches the stage of incapacity for work, and long before the cataract is mature. Many months and even years of enforced idleness, loss of earning power, and above all, protracted anxiety can be avoided.

Progress in the management of cataract has opened three sources of hopefulness. The first furnishes a means of avoiding many unnecessary cases of cataract formation by preventive measures, periodic health examinations, including the eyes, and care in the wearing of glasses if needed. The second reason for a hopeful outlook is furnished by the program which, if properly followed, may arrest the process in many instances and render operation unnecessary. The third and most heartening of all measures to raise the hopes of those who are threatened with semiblindness from cataract is the progress made towards better surgery with increased safeguards to insure better results, a shorter period of hospitalization, and the ability of the surgeon to save his patient many months of anxious waiting and total incapacity with its accompanying economic loss.

Lighting for the Conservation of Vision

Percy W. Cobb, M.D.

WHILE no effort should be spared to improve lighting conditions to the very highest practicable degree, explains Dr. Cobb, it is folly to expect lighting alone to effect benefits if the eye defects are not corrected by competent medical attention

THE activity that we call vision may be looked upon as a co-operative affair between the eyes, or organs of vision, on the one hand, and the light, without which they are useless, on the other. Since in this joint enterprise the eyes are the active and principal participant, it might easily be supposed that a slight defect in them would outweigh large deviations from the best possible in the intensity and distribution of the light; the more so since during the centuries before the control of fire, while primitive eyes and human eyes were being evolved, no control whatever over the light or lighting was possible, and the eyes have presumably, during that unbelievably long period, come to adapt themselves to what is at hand. As a matter of fact, the exact work which has been done upon this question all supports the hypothesis. A small defect in the eyes themselves proves to be a far greater handicap to the process of seeing than does any defect in the lighting system that is ever likely to be encountered where even limited care and intelligence have been used. Even so, however, whether one is an employer, anxious to get the best return from the labor he is paying, or a philanthropist, anxious to conserve human health and happiness, it would seem worth some cost to remove a moderate or even a small handicap from the eyes.

There are several more or less distinct goals toward which the effort must be directed in the design of artificial lighting. In rating these it would be hard to place them in the exact order of their im-

portance. Possibly the order will rather be historical. These objectives are, at any rate: (1) safety; (2) comfort and ease in activities which do not especially tax the organs of vision; (3) aesthetic enhancement of the surroundings; and last, but certainly not least (4) the ease and facility of fine and close eye work.

From the standpoint of conservation of vision, the fourth consideration stated above, namely, the ease and comfort of long continued work, such as taxes the organs of vision, would seem to be the first consideration.

The Visual Field

If we think of a person working, possibly at writing or reading, we can imagine his eyes at the center of a sphere—rather, let us say, a hemisphere. The point upon which his eyes are fixed at the instant, we will call the pole of this surface. From the pole we can imagine meridians drawn—horizontal, vertical and oblique—and drawn about the pole we can imagine circles or parallels of latitude, each of which represents a certain angular distance from the pole or point of fixation. This gives us a chart or map of the visual field, and upon each point of such a chart we might indicate the brightness or stimulus-value of the outer object, whatever it is, which is in line with this point. This map would then, something after the manner of a relief map, exhibit a complete approximate account of the brightness or intensity of stimulus acting upon the retina at each image-point corresponding to a point on the sphere. Such a chart would be a statement of the light conditions under which the eye has to work at that instant.

In experimental work simple conditions have often had to be planned. The actual practical distribution of brightness in a given visual field is generally too detailed for simple statement. Then, again, the time factor must be taken into account. The eyes shift about, while the external objects are stationary, and the whole picture on the retina is thus slid about accordingly. However, the visual field remains a logical and convenient frame of reference, within which, by specifying the angle of meridian and the angular distance for the center, we can specifically locate the character and intensity of any factor in the light conditions affecting vision.

Then, as to the test of how vision is affected by these factors.

This has most often been made at the pole, or point of fixation in the field, which corresponds to the fovea of the retina where the acuity of vision is at its highest. It must be borne in mind, however, that in rapid work—in reading for example— it has been

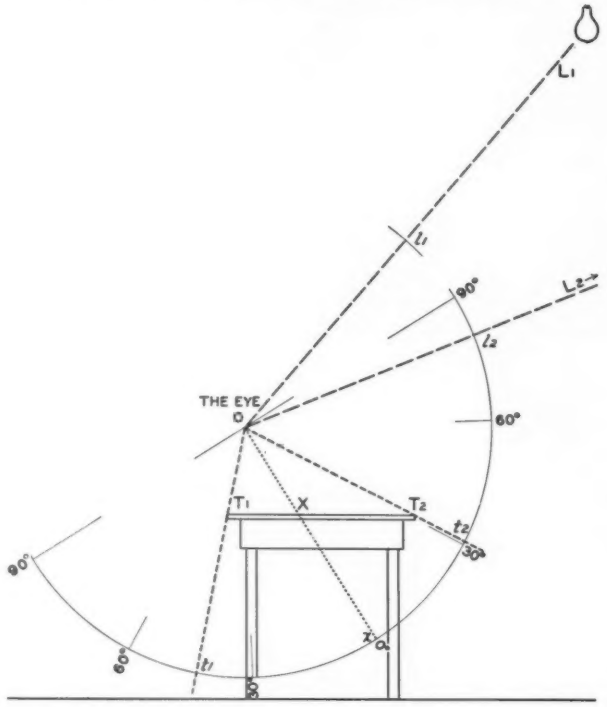

Figure 1.—The visual field. The hemisphere is drawn about the eye at **O** as a center. **X** is the fixation point (or work). Its projection is at **x** on the sphere, which is made the center of the map. The edges of the table, $\mathbf{T_1}$ and $\mathbf{T_2}$, as well as the light sources, $\mathbf{L_1}$ and $\mathbf{L_2}$, are similarly projected at other points. Compare Figure 2.

found that the eyes do not glide along the line of print, but make several jumps along the line, landing for a brief period, and landing, not on the larger and more distinctive words of the text, but as a rule on the shorter and commoner ones.[1] In addition, it has been shown that during the jump, while the eye is in flight, nothing is seen.[2] The wires are disconnected, so to speak, during that brief

interval, and the blur and confusion that would otherwise result is so avoided. It follows from this that the more important and distinctive details of the print are taken in while imaged, not at the center of the retina, but a very few degrees away from it. This consideration has occasionally led to the choice of a test point not

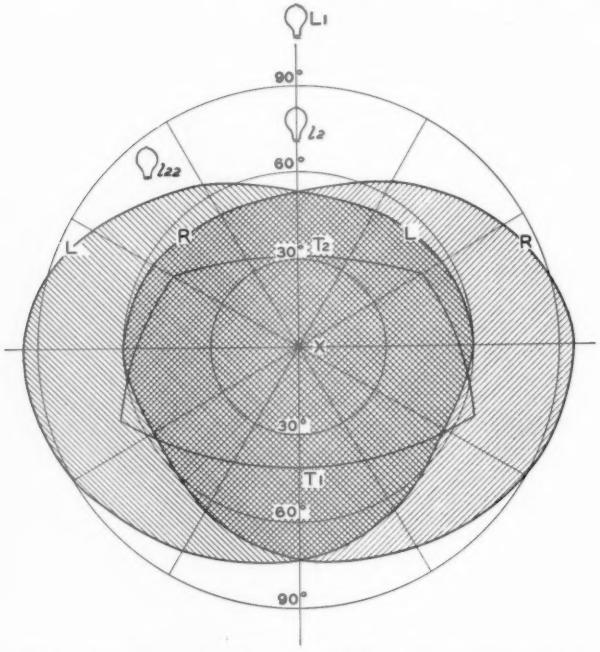

Figure 2.—The map of the visual field. The fixation point is central at **X**. **R R** and **L L** represent the limits of the sensitive right and left retinas. The light L_1 is outside the map. The light l_2 is not within the sensitive area. In case it is to the left, rather than straight in front, it might be represented at l_{22}. The table top is indicated by T_1 and T_2.

at the exact center of the field, but a very few degrees away from it. Possibly the advantage of this is more academic than real. It is much simpler, especially with unaccustomed subjects, to let them do as they invariably will unless otherwise instructed. That is, to fix the eyes directly upon the test-object when asked to report what they see there.

Tests of Visibility

The particular form of test used has been various. The conceivable number of possible tests of visibility is legion; and no test has ever been shown to have universal significance. Some of those that have been applied may be mentioned. Historically first is the visual acuity test as used by the ophthalmologist, or some simple modification of it, of similar significance[3]; the least perceptible difference in brightness between two halves of a small bright field[4]; the power to sustain clear seeing of a small object placed at a distance just within the limit of visibility so as to be of fluctuating clarity, measured by that fraction of a limited test period during which the object is seen clearly[5]; the accuracy, guided by vision, of the ability manually to adjust a marker to opposition with an irregularly moving one.[6]

Another point has to be mentioned; then we can discuss some of the results. The test may be used in two ways. First, we may continue some form of task involving vision, over a protracted period under a given set of light conditions, and note the progressive decline, if any, in the output of work. This has been done in the laboratory, and the various work tests which have been conducted in factories, under various lighting installations, fall into this class. In this case the work is itself the test. Second, a specially devised test may be conducted before and after a protracted period of work of any appropriate sort under the conditions which are being investigated.[5] In the second case, the decline in the result is to be interpreted as a measure of the cumulative effect or "fatigue" which has come about under the conditions of the work period.

Results of Experiments on Visibility

The foregoing is an attempt, in brief, to give a bird's-eye view of the experimental work that has been done. This work has, in some respects, been disappointing from the fact that practical visual conditions, as they might be mapped in the visual field, are invariably too detailed and complex to make possible the calculation, from the experimental results, of a prescription for the best or most efficient lighting distribution; and also from the fact that often the differential result is so small, even after protracted ex-

perimentation, and so variable, that one has doubts as to its significance or importance. Still there are certain results which have appeared, first and last, which may be generally stated.

1. Some conclusions that had been reached by common observation and judgment have been confirmed.

2. Rather definite limits have been set as to the effectiveness of these and other influences.

3. At least one fact has appeared which has not been accounted for by measurements of visibility such as have been outlined.

The grossest insult to the organs of vision is a light source disposed so that it sheds light directly into the eyes of the worker, *i.e.*, so that it lies in his visual field. However, this is not so bad, provided its intensity is not too high (in general, not higher than would be accounted for by the illumination on the work); provided it is not too near the eyes; and provided it does not lie too near the line of direct vision. It has been found under conditions otherwise resembling those of practice that unless the light source is within 25 degrees of the center, vision will not thereby be measurably affected.

Impairment of Visibility by Glare

But a light source in the field of vision gives rise to another sort of disturbance, aside from the impairment of sensitiveness as measured by a visual test. This is a feeling of discomfort or of glare. For this there is no measure except the testimony of the subject, but this is so positive and so universal that it simply cannot be disregarded. To some extend, it parallels the findings of the visual test; but there is a difference. Suppose the glaring source is a highly concentrated one, such as, perhaps, a visible incandescent lamp filament. There is a measurable reduction of visibility at the center of the field and, at the same time, the subject reports a definite discomfort from the source. Now suppose the lamp is enclosed in an opal globe, but still remains in the same place and sends the same quantity of light into the eyes. The discomfort is immediately diminished, or disappears altogether, but a test of visibility gives the same result as before. Thus while the impairment of visibility is found to depend, other things remaining the same, upon the total light that enters the eye from the source,

regardless of the extent of the source in the visual field, and hence regardless of the area of the retina (within certain limits of course) over which its direct light is spread, it is otherwise with the concomitant discomfort, which diminishes greatly and at once when the same quantity of light comes from a larger area in the visual field and is spread out correspondingly thinner over the sensitive retina.

Such concentration of emitted light is extremely high in the bare filament of a modern incandescent lamp. This has been met by the universal use of frosted lamps in the smaller sizes, and the invariable recommendation that the larger sizes be enclosed in a diffuser of some sort—most often, perhaps, an opal enclosing globe or something similar; and by the further rule that direct light from the lighting unit should not, if it can be avoided, be allowed to enter the eyes.

Avoidance of Glare

This last requirement, practicable in some cases, can obviously not be met in case it is a large room—office or factory, say—which has to be lighted. The general practice here is to mount the light units fairly high, a few feet above the head of a standing person, and to space them so as to yield a satisfactory and reasonably uniform illumination at table height throughout the room. The fixtures are designed to shed light chiefly downward, and so as to direct a comparatively small amount of light horizontally or at angles near the horizontal. Thus, a person with his eyes directed across the room finds that those sources which are near the center of his visual field are the ones farthest away, and send little light directly into his eyes; while the nearer ones are at a much greater angular distance from the center, and become innocuous for that reason. Thus the problem of glare, or direct light in the eyes, has reached a satisfactory compromise.

In passing, it is to be remarked that the conditions to be met by the individual worker in such a room are by no means described when the lighting arrangements have been specified. Obviously, a person working near the wall of such a room will have quite a different visual outlook if he works facing the room with its array of lights, than if he turns about and faces the wall, thus putting the light sources behind him. It can easily be seen, too, that

merely shifting the eyes under the former condition will, for the time being, alter the whole map of the visual field.

The impairment of visibility with light sources in the field of view has its parallel even in the case of very extended light areas. There are few who have not noticed how difficult or impossible it is, while in a brightly lit room, to see through the window what is going on in the dim light outside; or again, when out of doors in the daytime, to look in through the window and distinguish objects in the interior. In both cases, the contrast darkening effect steps in and prevents the clear seeing of objects lying within the relatively small and dark area of the visual field, and when we wish to see what is going on outside at night, it is often quite effective to darken the interior.

However, it will not do to go to the opposite extreme. At first thought, it might seem that the best condition for vision will be the exclusion of all light, except only a narrow beam, wide enough to cover the work area, and to leave the remainder of the field as dark as possible. Against this plan, there is the weight of several important arguments, from common sense, from common experience and from experiment. To begin with, the environment under which the race has grown up, in the evolutionary sense, has seldom, if ever, challenged the eyes to become adapted to such conditions. Widespread daylight, or the equally widespread and dim light of the moon and stars have been the rule all through the eras since life began. Further, the experience seems to be general that reading for a long period, with the paper held near the only light source in the room, is very apt to lead to discomfort, to a tired and possibly "sandy" feeling in the eyes, and eventually, often, to sleepiness.

Finally, experiment has something to say which gives definiteness to all this.[7] A small test field, of perhaps two or three degrees' diameter, can be arranged so that it may be presented on an extensive background of widely variable and measurable brightness; and arrangements are made to measure the sensitiveness of vision within this small central field. As the outer area is increased in brightness above that of the test field, this latter turns gray, and then black, by contrast, and it is found that vision thereon is reduced—enormously reduced under extreme conditions. If, how-

ever, we go the other way and diminish the brightness of the extensive background, we find that, to a certain extent, the same thing takes place. In spite of the fact that the small area becomes more brilliant, perhaps even glistening, as its background grows dark, visibility within that area is reduced; and although this impairment is minor, as compared with the opposite case, it is inevitable. Not only is it, of itself, an unfavorable finding, but it suggests a physiological condition which might reasonably be supposed to have much more far-reaching consequences in the long run. While this is, of course, a somewhat speculative conclusion, it must not be forgotten that the reports of common experience, under settings similar to this, point the same way.

General Rules for Good Lighting

Enough has been said so far to make it possible to lay down certain general rules which may be followed in providing lighting. The plan of general lighting has been described in which units are installed at regularly spaced intervals, some feet overhead, these units being so designed that the light is directed mainly downward, avoiding to a large extent the evil of glare from light horizontally directed into the worker's eyes. Such a plan provides lighting which has been found practically adequate for a great many forms of work, provided the intensity is sufficient. If one asks what the intensity should be, the most general answer that can be given is that it is never too high. Tables have been prepared by lighting engineers, giving recommended intensities of illumination for various forms of work. It might truthfully be said of these that the values of foot-candles given are minimum values; that to go below them would be to make the work more difficult for the eyes; that to go above would certainly be entirely without harm of any sort except increased cost, and might, in fact, possibly yield a corresponding advantage for vision. Natural light in the open is so far above any intensity ever proposed for artificial light, that the danger of too much is out of the question. It is a very dull day when the light from the sky falls below 500 foot-candles. If this intensity were to be attempted in any system of artificial lights of the present time, special arrangements would have to be made to get rid of the excessive heat.

Thus the real danger of going wrong in the direction of too much light is a vanishing one. However, the question of how that light is to be applied is a matter of moment. The consideration of glare, or direct light from the sources, has been mentioned, and it has been shown how a working compromise has been reached in lighting for work. In this connection it must be remembered that shiny surfaces such as glossy paper and polished or glass table tops in an office, or metallic surfaces in a machine shop, may reflect light from the sources into the eyes, and prove worse than the sources themselves, for the simple reason that the reflected light comes to the eyes from the direction of the work, or nearly so, and cannot be avoided as are the sources themselves, when the eyes are directed somewhat downward as they usually are. In thinking of glare, then, the presence of polished or shiny surfaces must be taken into account, as well as direct light from the sources.

Lighting Requirements of Special Types of Work

Something will also depend upon how the light falls upon the work-area. The general lighting, as has been described, usually aims to attain a certain number of foot-candles on the table-top level, say 30 inches from the floor. This light comes chiefly from above, that is, from many directions, and at angles not very far from the vertical. For many purposes this does very well. But for the best results the nature of the work has to be considered. To illustrate this point, let us picture one or two situations involving shadows. First, suppose the object to be seen is a thread, lying on a fabric of the same color. It is easy to see that the shadow of the thread may be the very thing by which the eyes locate it. Hence, in this case, light coming from all directions will put the worker at a disadvantage, in that the shadows of the thread will be numerous and dim; while a fairly well directed light from a single source will cast a deep and unequivocal shadow, and readily reveal the location of the thread.

The antithesis to this benificent effect of a shadow is the case in which the details to be seen fall entirely within the shadow, as in trying to read with one's own head, or someone else's, interposed between such a single light source and the page. Or, what is much worse, as anyone who has tried it will know, the case of a draftsman

attempting to draw a line in the deep shadow cast by his straight-edge. This, indeed is an attempt which is made but once in a lifetime, and the draftsman will either rearrange his light, or rearrange his table and himself, to obviate that situation. This is perhaps one of the cases in which general illumination, coming from many directions and chiefly downward, is at its best.

We see then, that shadows are neither an unmixed blessing nor an unmixed evil. They are a factor which has to be dealt with, especially when the general lighting of a room is supplemented by local lights at the work-places, that is to say, when we begin to light the work instead of merely lighting the space. Then each particular routine job that arises in the division of labor becomes a lighting problem in itself, for which, as we saw in the case of the shadows, no rule can be laid down. Each case must rest upon the nature of the work and the ingenuity of the lighting engineer, in order that the light supplied at that work-place may be best adapted to the vision of the worker in seeing that particular thing, whatever it is, which is the critical thing in the fulfillment of the work for which he is there.

The movement in this direction may go even farther, to the development of various kinds of special or "trick" lighting, each designed to facilitate some highly special operation. For certain reasons, probably of an economic nature, lighting engineers have not interested themselves in these problems to any great extent, and it has remained to the alert and ingenious shop superintendent to design and build such devices. In all cases, to repeat, the element of glare is to be avoided. Direct light from the source or sources, or from mirror-like surfaces, should not be allowed to fall into the eyes.

Importance of Correcting Eye Defects

This discussion will end with a warning which was sounded at the beginning. The examination of a large number of employees in the post offices in New York revealed the fact that not more than 10 or 20 per cent had normal vision in both eyes, with freedom from eye defect of one sort or another. Some 60 per cent of the whole number were able to show normal visual acuity in one or both eyes. This latter figure, of course, includes cases of defective

vision. A survey of large numbers of employees in ten different industries showed a corresponding figure ranging from 41 to 87 per cent. That is, this percentage had normal visual acuity in one or both eyes, but, even in these, the presence of defect was not excluded. This is enough to show the high prevalence of visual defect among factory and office workers.[8]

We shall not stop to discuss the question whether or in what degree modern conditions of work are to be assigned as the cause of these defects. Unquestionably, in large part, it has been modern conditions of work, and modern medical knowledge of the organs of vision, which have brought these facts to light. They exist. And while no effort should be spared to improve lighting conditions to the highest practicable degree, and so to bring about increased efficiency and comfort, it is nevertheless folly to expect lighting to effect benefits such as only competent medical attention can afford. Such defective eyes demand correction, as far as possible, at either public or private expense; and when this proves insufficient, a change for the worker to a job which makes demands upon the eyes not in excess of their capacity.

References

1. Huey, E. B.: *The Psychology and Pedagogy of Reading*, New York: The Macmillan Co., 1924.
2. Holt, E. B.: Harvard Psychological Studies, 1 (Psychological Review Monograph Supplements, 4), 1903, pp. 3–45.
3. Cobb, P. W., and Moss, F. K.: The Four Variables of the Visual Threshold, *Journal of the Franklin Institute*, 205: 832, 1928.
4. Cobb, P. W.; The Effect on Foveal Vision of Bright Surroundings—III, *Journal of Experimental Psychology*, 1: 419–425, 1916.
5. Ferree, C. E.: Tests for the Efficiency of the Eye Under Different Systems of Illumination and a Preliminary Study of the Causes of Discomfort, *Transactions of the Illuminating Engineering Society*, 8: 40–61, 1913. (See also later volumes of the *Transactions*.)
6. Cobb, P. W., and Moss, F. K.: The Effect of Dark Surroundings upon Vision, *Journal of the Franklin Institute*, 206: 827–840, 1928. (See also *id.* April, 1925, pp. 507–512.)

7. Cobb, P. W.: The Effect on Foveal Vision of Bright Surroundings—IV, *Journal of Experimental Psychology*, 1: 540–566, 1916.
8. Thompson, Lewis R.; Schwartz, Louis; Ives, James E.; and Bryan, Norris P.: *Studies in Illumination.* I—The Hygienic Conditions of Illumination in Certain Post Offices, Especially Relating to Visual Defects and Efficiency. Public Health Bulletin No. 140, Washington: Government Printing Office, 1924, pp. 49–63.

What Can an Organization for the Blind Do in Preventing Blindness?*†

Conrad Berens, M.D.

IF our highest ambition is realized, says Dr. Berens, we may ultimately reduce the number of the blind to about 25 per cent of the present total

MORE than fifty years ago a distinguished authority said that one-third of all blindness should have been prevented, one-third might have been prevented, and only one-third was inevitable. Statistics obtained from the British Isles only twelve years ago form the basis for a similar statement made by Dr. Bishop Harman of London. Active co-operation with the Committee on Statistics of the Blind, reviewing recent data on the causes of blindness, justifies the statement that probably not more than 25 per cent of blindness is inevitable.

When we consider that the first active effort to work with the blind was instituted 150 years ago, we can but admire its remarkable development. Organizations for improving the conditions of the blind were obliged first to undertake work of the most urgent nature, and the importance of their contribution in providing opportunity, care, education, training, and means of existence for those handicapped by loss of sight cannot be overemphasized.

It is encouraging that this Association and others which work with the blind are also sponsoring work for the prevention of blindness. In this paper I hope to outline a few of the activities which may be of value in this work. As knowledge of the causes of blindness increases, efforts to help the blind must include, in so far as

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possible, the elimination of factors responsible for their condition and the institution of energetic preventive measures. Although it is agreed that those who are blind should be assisted in every possible manner, efforts to prevent the future need of this work are as commendable as the recognition of the importance of preventive medicine.

I am happy to be able to demonstrate, by means of concrete cases, that measures directed toward the prevention of blindness by certain agencies and institutions caring for the blind undoubtedly have resulted in preventing much unnecessary blindness, and furthermore have been instrumental in restoring sight to many who were considered permanently blind.

In presenting a program for the prevention of blindness three activities must be stressed: (1) Co-operation with ophthalmology and medical sciences in obtaining information as to the causes of blindness and means through which blindness may be prevented and good vision may be conserved; (2) the interpretation and dissemination of this information to the public; (3) co-operation with other agencies so that laws may be enacted and social conditions improved.

Co-operation with Ophthalmology and Medical Sciences

Blindness from certain causes will often yield to treatment or operation, *e.g.*, cataract, etc. In other cases, where vision has not been entirely destroyed, the progress of the disease may be arrested and sometimes an improvement in vision effected, *e.g.*, keratitis, glaucoma, etc. Only a physician who has made a special study of diseases of the eye can diagnose the condition accurately and judge the possibility of improvement or cure. The lay worker, however long his experience, has not the necessary knowledge or skill to do this and should not undertake the responsibility of attempting it. It cannot be overemphasized that until the opinion of a competent ophthalmologist has been secured, the agency for the blind should not assume that the new client is necessarily and permanently blind. The importance of this statement was vividly illustrated recently in a study of the causes of blindness. The examination of data from several schools for the blind disclosed the fact that vision in many cases was so good that even

without operation or special treatment these patients should not have been considered as candidates for a school for the blind.

Routine Examinations.—However incredible it may seem, there is proof in homes and schools for the blind that the co-operation of eye physicians has not been obtained in making examinations of persons reported as blind. For example, Dr. J. E. Blaydes[1] showed that in one school for the blind with an enrollment of 114 pupils, the sight of 11 could be restored to normal; 8 could be improved to practically normal (20/30 to 20/50); 7 could be given vision sufficient for reading (20/50 to 20/70); 3 could be given vision of 20/100 to 20/200; and 3 could have "travel vision" (5/200 to 10/200). Thus 32 of 114 pupils—29 per cent—in one school for the blind might have had their sight greatly improved by proper medical and surgical attention.

At the time of the survey of schools for the blind which was made by one of the subcommittees of the White House Conference on Child Health and Protection it was found that in 44 schools, having a total enrollment of 4,195, there were 673 students (16 per cent) having sufficient vision to permit their reading ink print.[2] It seems unnecessary to recount the advantages to children of being transferred to sight-saving classes rather than being classified as blind.

It is likewise true that men and women, after having been classified as blind, have been thoroughly examined by an eye physician who found that vision could be improved to such a degree that many of them could be self-supporting in occupations requiring sight. Our statistics from the Lighthouse Eye Clinic of the New York Association for the Blind show that between November 1, 1932 and May 27, 1933—a period of seven months—50 patients reported to be blind were transferred from the blind to the seeing classification. The summary follows: The vision of 18 patients was restored to normal by means of glasses; the vision of 23 was improved by glasses; 4 were improved by treatment; and operation improved the vision of 5. Previous to their re-classification, a number of these patients had received financial aid and subsidized employment.

The records of the Lighthouse Eye Clinic furnish the following case report: E. F., age 65, formerly a waiter in a restaurant.

Cataracts developed in both eyes twenty years ago. The left eye was operated on immediately. Postoperative complications resulted in loss of vision. At that time and at subsequent observations he was advised not to have the right eye operated upon. After the patient was examined at the Lighthouse Eye Clinic, the symptoms in the eye previously operated upon were diagnosed as arising from a focus of infection. Following treatment, an operation was performed on the right eye. His vision is now 20/15.

A case recently reported was that of a woman who, for nine years, had been considered blind and had been receiving social service and subsidized employment from an agency for the blind. When an eye examination was arranged for, it was found that, fitted with the proper glasses, she had practically normal sight.

These are only a few instances of the saving of money and effort, to say nothing of the increased happiness of the individual, which may be achieved through a routine eye examination. When the client still retains a certain degree of vision, it is important to know what the visual acuity is and what activities he may safely engage in without jeopardizing that sight. In this, the opinion of the eye physician is essential.

For these reasons, in every agency an eye examination and diagnosis by a competent eye physician should be one of the first steps in procedure with a blind client. If the patient has been under the care of an ophthalmologist, a re-examination may not be necessary, but in such a case the agency should consult the ophthalmologist immediately and secure as full a report as he is able to give. Other exceptions to the general routine will be found; for example, very aged or feeble clients, those who have had both eyes enucleated, and those who live in isolated districts where no physician is available. Nevertheless, it will be found that in most cases an examination can be arranged for, and it should therefore be established as a routine procedure to be departed from only when exceptional circumstances justify it.

Certain agencies may feel that routine eye examinations are impractical because of the expense involved. It may be that they have no funds to pay for such examinations, that their clients are unable to pay for the services of a private physician, or that no ophthalmologist is available. In such situations, however, an

effort should be made to secure the co-operation of the county medical society or some similar body, in making the necessary eye service available. Lions Clubs or other volunteer groups are usually willing to defray the necessary expenses of travel, etc., and eye physicians will give their services without charge when they understand the serious need.

Routine examinations of the eyes are also valuable in building up reliable knowledge of the prevalence of the various causes of blindness. When records are more complete so that proper classifications may be made, authentic data may be assembled. Organizations for the blind may well contribute to this knowledge by keeping accurate records, the beginning of which must be the routine eye examination.

What Are the Causes of Blindness?—Among the direct causes of blindness, presented from the point of view of the worker with the blind, the following may be mentioned:

Cataract.—In an analysis of 360 records of the blind, cataracts (congenital, diabetic, and other types) were reported as the cause of blindness in one-third of the cases. Since these figures were compiled in a state where routine examinations of the eyes were not the rule, the percentage may be high, but it indicates that if examinations had been made when patients came under observation, undoubtedly operation would have saved the sight of some.

Statistics from the United States residential and day schools for the blind show that 14.8 per cent of the 5,286 pupils in these schools are blind as a result of congenital cataract. Newmayer[3] records the interesting case of a family of five children, three of whom had congenital cataracts of both eyes. Following operation, the vision of the two older ones, aged 12 and 14 years, was 15/100 in each eye. The youngest child, three years old, has not yet been operated upon. Many cataracts result from injuries, either simple blows on the eyes or penetrating injuries, and naturally many of the cataracts of this type are preventable.

Incipient senile cataract develops in people past middle age, but it is probable that age is not the most important factor in the production of the cataract. We are beginning to realize that the patient's general condition plays an important part in the cause of cataract.

For a long time we have been impressed with the close relation that exists between chronic infection and cataract. Often one sees a slowly developing cataract associated with a chronic sinus infection. We are being forced to the conclusion that the majority of cataracts whether in children or in adults, have a cause, even if we are unable today to find it. In the present state of our knowledge, we must make every effort to find that cause, whether it be in the nose or throat, sinuses, teeth, intestinal tract, blood (example: diabetic cataract), glandular system, or due to a congenital or hereditary defect. Several years ago, in a certain hospital in a large city, every patient with a cataract was operated upon as soon as possible. No thorough general examination of the patient was made. At present, in most hospitals, careful general studies, including Wassermann tests, urinalysis, and blood chemistry, are usually made before operation is advised.

Finally, a brief word on the treatment of cataract—once the cataract has become established, it cannot be dissolved. It consists of degenerated lens fibers enclosed by the lens capsule. In the incipient stage, improvement in visual acuity may occur under appropriate general treatment. This may not be due entirely to a decrease in the extent of the cataract, for once the fibers are degenerated they will never return to normal, and operation is the only cure.

Organizations for the blind can aid in preventing cataracts by disseminating information in regard to the hereditary nature of certain cataracts and the possible danger of transmitting the defect; by aiding in safety campaigns in industry and by stressing the danger of playing with pointed instruments and air rifles; and by assisting public health organizations in raising living standards and promoting measures to improve health.

Ophthalmia Neonatorum (Babies' Sore Eyes or Gonorrheal Conjunctivitis).—While all inflammation of the eyes in the newborn is not due to gonococci, the gonorrheal variety leads to the most serious consequences. Fortunately, the incidence of ophthalmia neonatorum has been greatly reduced, as announced at the recently celebrated twenty-fifth anniversary of the National Society for the Prevention of Blindness. Twenty-five years ago 26.5 per cent of the pupils entering schools for the blind owed their

misfortune to babies' sore eyes. Seven years later the percentage had been reduced to 15.1. Now it is 7. This is the result of the adoption of laws, in most states, requiring doctors, nurses, or others in attendance to put prophylactic drops in the eyes of babies at birth. The complete eradication of this source of blindness is regarded as scientifically possible, and laws requiring the use of a prophylactic should be enacted in every state. The co-operation of associations for the blind can aid materially in obtaining legislation requiring the use of a prophylactic.

Syphilis.—Conservative estimates tabulate syphilis as the cause of at least 15 per cent of total blindness in several occidental countries. For every case of total blindness traceable to syphilis, several times as many cases of serious impairment of vision are due to this cause.

Patients may be divided into two classes: those with acquired syphilis and those with congenital syphilis. In those who have acquired syphilis, ocular signs often appear long after the initial symptoms of the disease have become manifest. Hard chancre (the primary lesion) of the eyelids is very rare but the mere fact that it occurs teaches us that the disease may be spread through kissing. Many patients, treated for a time and seeing no signs of skin disfigurement or external evidence prompting further care, fail to follow medical advice. The tissues of the eye like the tissues of the spinal cord and central nervous system, are most susceptible to infection and suffer from the accumulation of toxic substances, which may not be easily recognized for 20 to 30 years after the onset of the infection.

Among the eye involvements which may be due directly or indirectly to syphilis are interstitial keratitis, iritis, choroiditis, retinitis, optic atrophy, and a number of other serious eye conditions. No structure of the eye is exempt.

When the seeing coat of the eyeball (the retina) is affected by syphilis, the blood vessel coat (the choroid) is likewise involved and chorioretinitis follows. In many cases syphilitic retinitis takes on a form which simulates retinitis pigmentosa (a progressive disease of the retina with pigmentation, the cause of which is unknown). We then see areas of pigment scattered over the entire back of the eye. These patients also have night blindness.

In these cases salvarsan and mercury may aid, whereas the cases of true retinitis pigmentosa are not benefited by these drugs.

Early recognition and appreciation of the importance of immediate and continued treatment, perhaps extending over several years, will tend to reduce loss of vision as well as the many other physical disasters consequent upon syphilis.

The ravages of congenital syphilis are so serious and can so largely be avoided by known preventive measures that we are challenged to fight for future generations of innocent children. Holloway[4] estimates that 75 per cent of congenitally syphilitic persons sooner or later show distinct ocular evidences of syphilis. The child may be born with normal sight but, with this disease congenitally present, vision may be slightly more impaired each year during childhood and youth. If proper precautions are not taken, such eye conditions as interstitial keratitis, one of the common causes of blindness, may result. It is, therefore, important that children in whom there is any reason to suspect congenital syphilis should be kept under careful supervision and that every precaution should be taken to control the disease. The congenitally syphilitic child may have certain characteristics which are easily recognized, such as the stature, shape of the head, formation of the teeth, etc., but in many instances no cranial or facial stigmas are evident.

Physicians generally agree that properly administered treatment of the expectant mother, commenced as soon as possible after the beginning of pregnancy and, in any case, not later than the fourth month, will almost certainly free the child born of such a mother from infection.

Parents whose blindness is due to syphilis, either congenital or acquired, should take every precaution to insure against blindness in their children from this cause. Agencies for the blind should seize every opportunity to put the correct information into their hands and to assist them to secure the proper treatment and care. By disseminating information in regard to blindness caused by syphilis and by co-operating with agencies dealing with the prevention of syphilis much unnecessary blindness may be prevented.

Hereditary Blindness.—Workers with the blind are often called upon for an opinion as to the danger of blindness in the children

of blind parents. It is therefore important for them to have a correct understanding of such questions and to use their influence in the right direction when the occasion arises. There is much misinformation current regarding the possibility of inherited blindness. But first it would be well to explain what hereditary blindness is.

Truly hereditary blindness is that which is transmitted through the germ plasm from parent to child. It is an inherent part of the child's make-up, present from the moment of conception, and manifests itself either in blindness from birth or in a weakness or defect which ultimately produces blindness. It is transmissible in the same way that the color of the eyes and the shape of the features are transmissible. Fortunately, cases of blindness which are truly hereditary are believed to be comparatively rare; but, unfortunately, little is known about the rules of their transmission. It is safe to say, however, that parents, who are themselves blind from hereditary causes or who have, in either family, cases of hereditary blindness, should not risk having children.

In the present state of our knowledge concerning the causes of blindness, it is difficult to differentiate hereditary from congenital causes. Statistics (1930–31) from residential and day school classes for the blind in the United States show that 28.6 per cent of all blindness is due to congenital and hereditary causes.

In a study of the causes of blindness among pupils in the Pennsylvania Institution for the Instruction of the Blind (1932–33), it was found that of 265 pupils, 120 (45 per cent) were blind from congenital and hereditary causes.

Nettleship[5] traced senile and juvenile cataract through 167 families, three to six generations being affected; and studied 238 cases of hereditary cataract. In one family, 30 members in four generations showed the defect.

Loeb[6] reported a family in which every member for five generations was affected with cataract. He also records cases of six families headed by blind parents in which 17 out of 31 children were blind.

Howe[7] found eight cases of glaucoma in one family. After several years this number had increased to fourteen. Forty years ago two young people, congenitally blind, were married. A few years ago their blind progeny numbered 17.[8]

Fortunately, many so-called hereditary eye defects are really congenital and due to birth injuries; but many thousands of cases are truly hereditary, and organizations for the blind can aid by disseminating information regarding these defects and by co-operating with agencies interested in hereditary and congenital diseases.

Trachoma.—While the United States has for many years refused admission to immigrants showing symptoms of trachoma, there are thousands of citizens and Indian wards afflicted with this disease, which often results in loss of sight and in economic failure.

Preventive measures are handicapped by lack of knowledge as to the exact cause of the disease, but all public health measures directed against over-crowding and those which improve health and living conditions are of value. All institutions for the blind should be careful to exclude applicants who have trachoma until an eye physician says the disease is not transmissible.

Glaucoma.—This disease causes much of the blindness of middle age and later life. Jackson[9] estimates that 12 per cent of all cases of hopeless blindness are caused by glaucoma. There is also the type known as congenital glaucoma, which occurs in infants. This is called "ox-eye" or buphthalmos. It is probably due to poor development or blocking of the outlet channels, and, occasionally, to a prenatal inflammation.

Glaucoma is now being treated as "a sick eye in a sick body" and, while no definite cause has been determined, certain investigators are beginning to believe that general disorders and chronic infections may play an important rôle. Relief from symptoms and arrest of the disease, but not a cure, are all that may be expected from treatment. Often blindness and intense continual pain can be avoided.

Agencies for the blind can aid by disseminating information in regard to the great necessity for the continued observation and treatment of patients who have glaucoma, by aiding the promotion of measures to improve the general health, and by urging the periodical examination of the eyes, especially in middle-aged, or older persons.

Tuberculosis.—Tuberculosis of the eye causes a large amount of blindness. It may appear in children in the form of disseminated choroiditis, that is, scattered areas of inflammation affecting the

blood vessel and seeing coats of the eye. It is estimated that 25 per cent of the diseases affecting the blood vessel coat of the eyeball which may result in blindness are caused by tuberculosis.

Another type of tuberculosis affects the central part of the back of the eye and may destroy central vision. Improving living conditions and diet, and seeing that the patient receives constant supervision and treatment, may effect improvement if the disease is not too far advanced. Certain authorities place great reliance in tuberculin.

Prevention is and should be under the guidance of agencies for the prevention and cure of tuberculosis and those interested in preventing blindness from this cause can be of greatest service by cooperating with these agencies.

Accidents.—The development of inventions and the resulting hazards of industrial life have brought about a large increase in the blind population. Professor Best's statement[10] that "external injury constitutes the most important cause of blindness through the greater part of life" is supported by the estimate[11] that, in the United States, approximately 15 per cent of those blind are so as a result of industrial accidents. It is evident that a still greater number have vision so impaired by injury as to handicap them for life.

In this class of blindness, especially, one finds evidence of the tremendous economic waste resulting from loss of efficiency and the actual financial cost of compensation. To mention an example: over a period of eight years, under the Workmen's Compensation Act in the state of Pennsylvania, compensation for loss of eyes constituted more than 40 per cent of the amount awarded for permanent injuries. In other words, of a $15,332,220 total, $6,201,762 was awarded for eye accidents, a greater sum than the combined compensation for loss of legs, arms, and feet and from miscellaneous injuries.[12]

The Pullman Company, one of the largest industrial organizations in the United States, reports the saving from serious injury or destruction of sight of approximately 1,000 men since the adoption of regulations demanding the use of protective goggles. Another company records a decrease in accident cost from $16,500 to $200 a year. Still another reports during a three-year period a

steady reduction of eye injuries from 103 to four as a consequence of the use of protective devices.

Blindness from industrial accidents may be reduced through the co-operation of the employer and the education of the superintendents and workers in means of preventing and caring for accidents.

Legislation, compensation for injuries and other governmental regulations undoubtedly will continue to play a most important part in forcing industry to reduce accidents of all sorts, and this will be advanced by the modern tendency to make industry responsible for loss of life and for permanent injury. The contribution of volunteer safety movements in the industrial field is also well recognized.

Automobile accidents, so frequently accompanied by flying fragments of glass, account for numerous eye injuries. It is gratifying to know that recently three states, New York, Nebraska and Pennsylvania, have passed laws providing that shatter-proof glass be installed in all automobiles. Fourth of July accidents are frequent preventable causes of blindness.

Workers with the blind can aid in preventing blindness from injuries by helping to disseminate information in regard to the frequency, causes and methods of preventing eye injuries and by co-operating with agencies dealing with the prevention of blindness from these causes.

Statistics of Causes of Blindness.—It is unfortunately true that there are in this country, and, practically speaking, in the world, no reliable data as to the prevalence of the various causes of blindness. Such studies as have been made include only limited areas, and, because there has been little uniformity in classifying the data, it is impossible to combine them into statistics representative of larger groups. Consequently, we have no authentic statistical data on which to base campaigns for the prevention of blindness, nor can we measure with any accuracy the progress made in prevention. Organizations for the blind are in a better position than any other agency to record and assemble these data, and may well feel an obligation to make this contribution to our knowledge of blindness and our activities for its prevention. Fortunately, the time and expense involved in assembling such data are very small. The routine eye examination by a competent ophthalmologist,

which we have already discussed as being an essential preliminary to the social treatment of the case, will afford the necessary facts; and the compiling of summaries is the smallest part of the task. I would therefore urge every agency for the blind to undertake to record as completely as possible the causes of blindness among its clients. The Committee on Statistics of the Blind, sponsored jointly by the National Society for the Prevention of Blindness and the American Foundation for the Blind, will be glad to give assistance in the compilation of such data.

The Interpretation and Dissemination of Information to the Public

Prevention of blindness depends primarily upon the education of the public as to the possible causes of blindness and the means which should be used to prevent it. This education may take the form of talks before women's clubs, Lions' Clubs, and other public bodies, talks to students in schools and colleges, newspaper articles, exhibits at county fairs, news letters sent out periodically, and other means of getting information into the hands of the lay public. It is gratifying to note, as I have stated earlier in this paper, that, through the use of such means, the incidence of ophthalmia neonatorum has been greatly reduced during the past twenty-five years. Since ophthalmia neonatorum may be prevented by the simple and safe method of introducing a solution of nitrate of silver into the eyes of the newborn child, there should really be no cases of blindness from this cause, and we must carry on until this entirely unnecessary and preventable disease shall have been completely eliminated.

Accidents are another cause of blindness concerning which the education of the public is essential. Although no figures are available, there is reason to believe that blindness from industrial accidents has been increasing. Safety education campaigns, particularly among factory workmen, will tend to decrease this. Blindness from Fourth of July accidents is also unnecessary and, because of safety education, is yielding to better understanding on the part of parents and children. Laws regulating the sale of fireworks have been enacted in several states, but they can be enforced only through the whole-hearted support of the public.

The public should be educated to consult a competent eye

physician when eye symptoms develop, for in this way many eye conditions, such as glaucoma (hardening of the eyeball), trachoma, and tuberculosis may be discovered, treated and controlled before sight is lost. In such cases time is often the most important factor.

It is essential also for the public to know the relation between general diseases and diseases of the eye, and to realize that many eye conditions have a background of deranged bodily function or disease that may be discovered by an eye physician.

Co-operation with Other Agencies

Co-operation with Eye Clinics.—In some institutions for the blind, every patient, before being accepted, is examined in an eye clinic, and the medical and surgical treatment indicated is carried out. One institution (Lighthouse Eye Clinic of the New York Association for the Blind) has developed its own eye clinic. In the last two and one-half years (November 1, 1930, to June 22, 1933) 2,313 patients have been examined. In this clinic, social service and follow-up work have been stressed, because it has long been apparent that probably the greatest field for preventive ophthalmology is in the eye clinic,[13, 14] and that clinics without proper social service work fail lamentably in preventing blindness.

If proper social service and follow-up work is carried out until treatment is completed on all patients with eye diseases which may result in blindness, much blindness can be prevented. In the Lighthouse Eye Clinic, 353 home visits were made and, 3,586 follow-up letters were written between November 1, 1930, and June 22, 1933.

Even though all organizations for the blind cannot have their own eye clinics in connection with their social service work, by aiding in the organization of follow-up work for their cases and by stressing follow-up work in other clinics in which they may have influence, they will do splendid work in preventing unnecessary blindness.

The preschool clinic in which children are routinely examined before they are old enough to attend school is most valuable. In these clinics early tendencies to eye diseases which might result in blindness are diagnosed and treated.

Co-operation with Public Health Agencies.—There should be the closest co-operation between the agencies for the blind and the

public health agencies in the prevention of communicable disease which may lead to blindness. Ophthalmia neonatorum comes under this head, as do measles, trachoma, smallpox, scarlet fever, meningitis, syphilis, and other diseases. Great progress has been made during the past twenty-five years in the prevention of communicable disease, but much still remains to be done.

It will be found that the public health nurse is one of the most effective agents in this type of prevention, and many ways will be found in which her active co-operation will prove most valuable. In this connection, it should also be pointed out that the public health nurse may be very useful in locating cases of blindness or prospective blindness, particularly in isolated communities. It would be well for the worker with the blind to spend some time and effort in interesting the public health nurse and in adding to her store of information about blindness and the possibilities of preventing blindness.

Promotion of Sight-Saving Activities.[15]—You are familiar with those cases of defective vision in which unwise use of the eyes will destroy whatever sight remains. This is particularly important in children, since the ordinary process of obtaining an education calls for constant use of the eyes. One of the most important activities in prevention of blindness is the promotion of sight-saving classes—that is, classes in the public schools where, through the use of large print, verbal instruction, exceptionally good lighting, suitable desks and special writing appliances (soft black pencils and unglazed paper), a child may receive an education without undue eyestrain.

The agency for the blind should interest itself in this type of prevention work, either in co-operation with other agencies, or, if necessary, as the leading spirit in the movement. Many states provide by law for the establishment of such special classes in the public schools, and all that is needed to bring them into being are energy and determination. In other states such laws do not exist and the agency for the blind should make every effort to see that proper provision is made for these pupils in need of sight conservation.

Should an Agency for the Blind Have a Prevention Campaign?

Some may feel that an agency for the blind is concerned only with actual blindness and should not extend its interest and duties

to include prevention work. Associations for the blind, when they sponsor any work for the prevention of blindness, carry authority which demands and receives attention, and their active co-operation in all preventive work is highly desirable. I fully appreciate that they have their own special work and problems and that most of the active work for the prevention of blindness should be carried on by organizations developed for this purpose. In many cases it is true that prevention work is adequately taken care of by other agencies, and that the agency for the blind should co-operate with them rather than institute activities of its own. In many communities, however, this is not true, and in view of the social and economic importance of preventing blindness as well as the value of increased human happiness it is essential that some agency should undertake it. In such cases it would seem short-sighted for agencies for the blind not to organize an active campaign for the prevention of blindness through co-operation with the National Society for the Prevention of Blindness.

Conclusions

I hope the suggestions presented have made it evident that an organization for the blind can aid materially in the prevention of blindness, and that this preventive work is one of its most important functions.

Much unnecessary blindness may be prevented if organizations for the blind will take active part in the following:

1. Having every client thoroughly examined by an ophthalmologist;
2. Securing surgical or medical treatment for all patients requiring it;
3. Establishing eye clinics and preschool clinics with social service and follow-up work in association with their work or aiding in the organization of follow-up work in other clinics;
4. Educating the public by means of lectures, pamphlets, posters, etc., in regard to measures for the prevention of blindness;
5. Co-operating with sight-saving classes or aiding in the establishment of classes;
6. Obtaining the passage of laws to improve social conditions and to require the use of certain preventive measures and safety devices;

7. Co-operating with national and local organizations for the prevention of blindness, and public health and other agencies which deal with certain phases of the prevention of blindness problem.

Organizations for the blind and those interested in working with the blind will be heard with eagerness when they speak on the subject of prevention of blindness. Certain of the statistics presented in this paper show that unfortunately much is yet to be accomplished in preventing blindness.

I hope that interest in this subject has been stimulated by this discussion and a desire for active co-operation in this work has been aroused. If this result has been attained we will have aided in bringing light and added happiness to many and, if our highest ambition is realized, we may ultimately prevent blindness in all but that 25 or 30 per cent of people in whom it was inevitable.

References

1. Carris, L. H.: How Our Schools for the Blind May Assist in Preventing Blindness, *Sight-Saving Review*, 2:3 (Sept.), 1932.
2. *The Handicapped Child*, Report of Committee on Physically and Mentally Handicapped, White House Conference on Child Health and Protection, New York: The Century Co., 1933, p. 65.
3. Newmayer, S. W.: A survey of the Semiblind School Children in the City of Philadelphia, *Atlantic Medical Journal*, 31:168 (Dec.), 1927.
4. Holloway, T. B.: Why Have Ocular Disasters? *American Health Congress Series*, Volume IV.
5. Nettleship, E.: On Heredity in the Various Forms of Cataract, *Royal London Ophthalmic Hospital Reports*, 16:179 (part III), 1905.
6. Loeb, C.: Hereditary Blindness and Its Prevention, *Transactions American Academy of Ophthalmology*, 1908, p. 246.
7. Howe, L.: A Family of Glaucoma, *Archives of Ophthalmology*, 16:72, 1887.
8. Lewis, F. P.: *Transactions Section on Ophthalmology*, American Medical Assn., 1918, p. 75.
9. Jackson, E.: Glaucoma, *Hygeia*, 4:523 (Sept.), 1926.

10. Best, H.: *The Blind*, New York: The Macmillan Co., 1919.
11. Resnick, L., and Carris, L. H.: *Eye Hazards in Industrial Occupations*, National Society for the Prevention of Blindness, 1924.
12. *The Prevention of Blindness*, League of Red Cross Societies, 1929, p. 26.
13. Berens, C.: The Importance of Social Service and Follow-up in Preventing Blindness, *Sight-Saving Review*, 2:83 (June), 1932.
——— Social Service and Follow-up in Ophthalmology; Conclusions After Restudy of Hospitals in New York and Brooklyn, *Transactions American Academy of Ophthalmology*, 1926, p. 226.
——— How Can Adequate Medical Social Service Be Provided in Eye Clinics, *Hospital Social Service*, 22:275 (Oct.), 1930.
14. Berens, C., and Taylor, M. K.: Social Service and Follow-up in Ophthalmology, *Hospital Social Service*, 16:89 (Aug.), 1927.
——— The Importance of Social Service and Clinic Management in Ophthalmological Clinics, *New York State Journal of Medicine*, 28:1470 (Dec. 15), 1928.
15. Hadley, H., and Hathaway, W.: Sight-Saving Classes, Their Organization and Administration, National Society for the Prevention of Blindness, 1929.

A Plea for More Sight-Saving Classes

A. L. Adams, M.D.

Introduction by Audrey M. Hayden

CAREFUL examination of the eyes of applicants for admission to schools for the blind will locate some who belong, more suitably, in sight-saving classes

Introduction

Dr. Adams' paper was read in May before the Eye Section of the Illinois Medical Society. His interest in the subject has been an outgrowth of his work as attending ophthalmologist at the School for the Blind in Jacksonville. He has felt, for some time, that many children were admitted to that institution who, seemingly, had too much vision to be educated through the medium of their finger tips. This, he felt, was unfair to the Institution but more unfair to the children for whom normal pedagogical methods were possible.

In November of 1931 the Commissioner of Public Welfare invited Dr. Harry S. Gradle, Dr. Sanford R. Gifford and Dr. Richard Gamble, all of Chicago, to make an examination of some 48 cases which Dr. Adams had selected. The showing on these cases led them to believe that a more thorough examination would be valuable. In the spring of 1933, therefore, the same three ophthalmologists spent an entire day at the School for the Blind, and made an examination of the 238 children enrolled at that time. They made the following recommendations:

1. That a model sight-saving division be established to which should be admitted only those children whose homes are not within available distance of towns in which sight-saving classes are already operating.

2. That the blind division and the sight-saving division should live together but should have entirely separate educations.
3. That the requirements for admission to the School for the Blind should be:

   Blind Division—vision, with correction, of less than 20/200.

   Sight-Saving Division—vision between 20/70 and 20/200, after refraction.

   For admission to the School there should be a certificate from a doctor licensed to practice in the state of Illinois and registered in the Eye Section of the Illinois State Medical Society, stating the diagnosis and condition of the eyes, and vision with and without glasses.
4. That the attending ophthalmologist at the School for the Blind should be authorized to refuse admission to children whose vision is too good for the above requirements. This implies examination upon admission.
5. That a systematic examination should be made every three years by members of the Illinois Eye and Ear Infirmary staff.
6. That the attending ophthalmologist at the School for the Blind should be authorized to remedy defects as occasion arises.
7. That the School should be equipped with a modern examining and operating room.
8. That the remedies herein suggested should be instituted during this next summer.

As a result of this splendid piece of work, a general reorganization program has been embarked upon. Mr. Woolston, the superintendent of the Illinois School for the Blind, had $3,300 released from the 1932–33 appropriations for the building and equipping of an operating room and two model sight-saving classes. The Illinois Society for Prevention of Blindness, acting in an advisory capacity, furnished the standards for the classes and arranged for the training of two teachers at the University of Chicago. The recommendations which the doctors had made for refractions were gone over carefully and the Society arranged for the refraction of those children living in communities where good ophthalmic advice is available.

The whole reorganization plan has been of intense interest to the Society for the Prevention of Blindness. In our surveys of the eyesight of school children we often find isolated cases which are not covered by our legislative program for special education in the public schools. The two sight-saving classes at Jacksonville will prove very valuable to us for such cases. We feel, however, that no partially sighted child should be sent to Jacksonville who can possibly be taken care of in his own community. Each sight-saving class pupil at Jacksonville will cost the state about $700 more than if the child were taken care of at home and so for financial reasons, not to mention social reasons, these classes should be used very carefully.

The value of Dr. Adams' paper is that it brings to the attention of the ophthalmologists of this state a condition which they may help to remedy and we feel sure, by the interest that it aroused, that he will have a more intelligent backing from his profession in the future.

What Is Blindness?

When it is considered how long the standard of normal vision has been established, is it not strange that there should not be a more definite idea of what really constitutes blindness? It has been described as "an incurable total loss of sight." The popular definition of it however is "that condition in which the sight is so diminished that any occupation requiring the use of the eyes is impracticable."

The Workmen's Compensation Act, the various Blind Pension Acts, and the laws governing the education of the blind call for an exact definition of blindness. In deciding whether or not a person is blind, it is often necessary to fall back on legal interpretation, to find out the intent of the law.

Educational blindness is present when the person cannot, because of loss of vision, receive an education in the public schools. Efforts have been made to establish a definite limit in visual efficiency. Some authorities would place this at 20/200, or one-tenth vision. Others would place it at 20/70.

Mr. Lewis H. Carris, managing director of the National Society for Prevention of Blindness, says in one of his reports;

"In general, it is considered expedient to call a person blind who has only one-tenth of visual acuity. But what about those of us who do not know what one-tenth of vision means, and how to measure sight? Then again, it is not sufficient to consider only the degree of vision; the extent of the visual field is an element of highest importance, and there are other factors to consider as well. It is necessary in censuses that each doubtful case be considered by a specialist with his complicated equipment in order to control these various standards."

Mr. Carris quotes the following definition of blindness from *Handbook on the Welfare of the Blind in England and Wales.*

"The Ministry of Health in circulars 681 and 780, explained the principles which they adopt in deciding whether a person is too blind to perform work for which eyesight is essential. Briefly, only visual factors can be taken into account and other bodily or mental infirmities should be disregarded.

"Where the acuity of vision (refractive error being corrected) is below 1/20 of normal (3/60 Snellen), the person may be usually regarded as blind. Where the acuity is better than 6/60 or 20/180 (Snellen), the presumption is that the person is not blind unless there are such counterbalancing visual conditions as great contraction of the field of vision, marked by nystagmus, etc. The test to be applied is not whether a person is unable to pursue his ordinary occupation, or any particular occupation, but whether he is too blind to perform work for which eyesight is essential."

In discussing the certification of blindness, N. Bishop Harman, London (*The Medical Officer*, December 24, 1932), who has done much to prevent blindness and assist the blind, mentions three cases that illustrate the practical difficulties encountered:

A woman with chronic glaucoma has vision of 6/9 but a field limited to 5° from the fixation point; she can read when she can find the place, but cannot walk without being led, and cannot see to shake hands with a visitor.

A country parson with central senile choroiditis and no central vision, but a good peripheral field, has complete freedom of movement, and knows his prayer book; and so goes about and performs all his parish duties.

A volunteer officer with retinitis pigmentosa had full vision and good fields by daylight; but had to be led when marching at night.

Organic blindness due to ocular lesions can be recognized or ex-

cluded with certainty. But psychic blindness, as illustrated by shell shock and hysteria, may puzzle or defeat the most experienced diagnostician. Seeing is done, not with the eye, but with the brain. The great mass of cerebral convolutions that have developed with accurate macular vision explains the enormous influence of vision upon all our consciousness, and suggests the possible influences of cerebral function upon vision.

In schools for the blind it is recognized that a large proportion of children have some sight. Harman says "Where there is no full provision for children with defective sight, and no choice between elementary school and the Blind School, it is inevitable that borderline cases will be drafted into the Blind Schools. The certification of blindness in children can rarely be final. It should always be recognized as provisional and subject to revision. No sharp and permanent lines can be drawn between blind and seeing, either by a formal definition, or a scientific test; and it is not desirable that there should be such a discrimination."

The majority of those called blind can find satisfaction and usefulness in the exercise of the remnant of vision they do possess. The most that can be done for them is to help them keep and use what sight they have. When it becomes necessary to discriminate between the seeing and the blind, for purposes of education or care, each case should be carefully studied for itself—by a person trained and experienced for such examination—both as to ocular conditions present and as to other abilities and surroundings.

Responsibility for Admission to Schools for the Blind

As examiner of the eyes of those making application for entrance to the Illinois School for the Blind, I have been deeply interested in this problem and feel that much can be accomplished by a consideration of these questions presented to you today. The decision as to the advisability of having a child with defective vision continue with his handicap in the public schools or to send him to the School for the Blind is often not easily made. It should depend not only on the actual eye conditions present, but on the probable outcome. We know that the vision in some children will in all probability improve, while in others, even though the vision is fairly good, we know it will inevitably become worse. The field of vision and light sense must be carefully considered.

There should always be an opportunity for a revision of opinion. Should the vision improve and the eyes be healthy, the student should return to a sight-saving class or to the public school.

As the children come from all parts of the state it is important that competent advice should be had as near their homes as possible before application is made to enter the School for the Blind. By this examination the amount of vision present and the necessity for treatment or operation would be determined.

I would recommend to the Board of Public Welfare the appointment of official examiners in the larger cities of the state—members of the Eye Section of the Illinois State Medical Society—who should make the preliminary examination of the eyes of those desiring to make application for admission to the School for the Blind. The final decision should be made by the ophthalmologist in charge at the School, after sufficient time for examination and observation.

The ophthalmologist of the School for the Blind or of sight-saving classes should be given the findings of these examinations by the examiners of the blind before an application is made for their admission. A moderate fee should be paid to these examiners, by the state, for this service.

From the larger cities most of the applicants have had competent advice from physicians and social service agencies, but often those coming from the country or small towns have the application made out by a neighbor, visiting nurse or an optometrist with the question as to the cause of blindness answered by "fever"; "sore eyes"; "had a fall"; or "don't know"; and the query as to the amount of vision is answered by "poor"; "can see large print"; "can see to get about."

The physician near home has the opportunity of getting more or less history from the parent or guardian, which is of great importance in determining the cause of blindness. When we find both eyes shrunken to the size of small buttons or even enucleated, and no history attached, the "Undetermined" in the records become understandable.

Illinois Law for Education of the Blind or Deaf

The basic law providing for the education of blind or deaf children in Illinois is as follows:

EDUCATION OF DEAF AND BLIND CHILDREN

An Act to make provision for the education of deaf and blind children. (Filed June 28, 1917. L. 1917, P 734)

683. **Duty of Parents or Guardian.** Section 1. Be it enacted by the People of the State of Illinois, represented in the General Assembly; It shall be the duty of every parent, guardian or other person, having the control or charge of any child in this state between the ages of eight and eighteen years, who is deaf or blind, or whose hearing or vision is so defective as to make it impracticable to have such child educated in the ordinary public schools of this state, to send such child to some school under private or public supervision, where special provision is made for the education of the deaf or blind; if there be such a school within the county where such child resides, then such child may be sent thereto, but if not, then to some other convenient school of that character, within the state or to the Illinois School for the Deaf, or to the Illinois School for the Blind, at Jacksonville. Provided, that nothing herein shall require a child not physically or mentally competent to be educated, to be so sent.

(Smith-Hurd, 1929–Chapter 122, Article 682, Section 1, Page 2727)

The opportunity for difference of opinion in the interpretation of this law can be easily seen. Given a child with even slightly defective vision, with an active mind and full of mischief, who fails to keep pace with his fellow students, a teacher overworked with forty or fifty pupils, a visiting nurse, and the stage is set for another applicant for the School for the Blind. On the other hand it is not at all unusual to have the field workers find a blind child whose parents had never heard of the School for the Blind.

During the past year among 250 pupils in the School for the Blind, 109 either had no vision or light perception only. Seventy-three could count only fingers. Fifty-five had vision with correcting glasses of 20/70 to 20/200. Thirteen had vision of 20/70 or better.

Of those having vision better than 20/70, three had high myopia. One had vision of 20/30, contracted fields, and night blindness. One had vision of 20/45 with coloboma choroid and nystagmus. Several who had congenital cataract, had vision of about 20/45

with correction. One with vision of 20/60, had macular changes. Five had vision of 20/70 with the better eye only.

While 55 of these 250 pupils have a vision between 20/70 and 20/200 and would seem to be eligible for sight-saving classes, we find that a large majority of them are from small cities and country districts where no such classes are available. The state requires these children to be sent to school between the ages of eight and eighteen and, at present, except in the larger cities, the School for the Blind is the only available place for them to attend school.

The Sight-Saving Class for Partially-Seeing Children

A method for the education of these children with partial sight was first developed, in the United States, by Mr. Edward E. Allen, a director of a school for the blind in Massachusetts. This school opened in April, 1913.

The plan consists in using the available vision under the most favorable circumstances. The teacher of these sight-saving classes should have special training for her work, after from two to five years experience in teaching children with normal vision. This special training is available at the summer courses at Columbia University, the Universities of Chicago and of Cincinnati and other universities. An intensive training for six weeks will enable a teacher to conduct a class.

Mr. Edward T. Myer in his survey of sight-saving classes in the public schools of the United States gives sixteen as the largest number possible to be included in a sight-saving class. These classes have been maintained in cities of only 3,600 school enrollment. The per capita cost at the Illinois School for the Blind last year was $862.41. The average cost per pupil enrolled in the public schools of Illinois for 1931–32 was $95.52. About four and one-half per cent of the pupils in sight-saving classes in the United States are returned to the regular classes in the public school after from one to two years' time.

At the present time there are 44 sight-saving classes in Illinois. Thirty-three are in Chicago, 2 in Joliet, 2 in Rockford, 2 in Rock Island, 1 in each of the following cities; Aurora, Elgin, Evanston, Springfield and Villa Park. There are usually twelve to fourteen children in each class. Villa Park, with a population of 6,220, is

the smallest city in Illinois in which a sight-saving class is established and to it come children from all over DuPage County.

Where the vision of an applicant in the better eye is found to be 20/70 or better, and there is no active pathology endangering vision present, the applicant should always be referred to a sight-saving class, provided one is in operation in the county from which he comes.

By the law passed in 1929 the state will provide $250 per annum toward the maintenance of one pupil in a sight-saving class. The law also provides that teachers shall be especially trained and the classes shall have state supervision.

Recommended Basis for Admission of Pupils to Sight-Saving Classes

No standard for admission to sight-saving classes has as yet been adopted by the Illinois Society for the Prevention of Blindness. In the meantime, we give herewith the standards proposed by a special committee approved by the National Society for the Prevention of Blindness in July, 1928.

1. Children having a visual acuity of 20/70 or less in the better eye after proper refraction are potential candidates for a sight-saving class. In addition, the following are recommended:

(a) Children in elementary schools having four or more diopters of myopia.

(b) Inactive, subsiding (or regressive) cases, such as interstitial or phlyctenular keratitis, optic neuritis, trachoma, etc., in which some irritation may be present—provided the approval of the attending physician is given.

2. All cases must be considered individually.

3. Any child who, in the opinion of the ophthalmologist would benefit by assignment to a sight-saving class, subject to suggestion for treatment and training by such ophthalmologist, and the acceptance of the educational authorities having charge of such classes.

4. It is assumed that all children assigned to sight-saving classes have average normal mentality.

Winifred Hathaway, associate director of the National Society for Prevention of Blindness says:

"The experiences of the twentieth century would seem to indicate that the sight-saving class is the best method yet developed for educating partially-seeing children, since it approximates as nearly as possible the education of the normally-seeing. It would seem almost unnecessary to have to justify the cost of the education of any child who is educable; humanitarianism alone would seem a sufficient justification. Yet it must be remembered that the State is responsible to the taxpayers for the use of public moneys; in consequence, the State must look upon expenditures for education as an investment that will pay justifiable dividends. The object of educating partially-seeing children is the same as in the education of any group; namely to prevent illiteracy and to develop the innate powers of the individual so that he will become an asset of the greatest possible value to himself and to the State.

"To give a partially-seeing child an even chance with the normally seeing, it is necessary to provide him with the opportunity to overcome his handicap. In order to do this, such facilities must be at his command as will permit him to develop along the line of his greatest strength, while his weakness, in so far as this is possible, is prevented from becoming worse."

The responsibility is largely ours in making the decision as to whether this child shall go to the School for the Blind or, if sufficient vision is present and the eyes in fair condition, to the public school or to a sight-saving class. If no sight-saving class is available to you, what can be done toward having one?

Schools for the blind are doing a wonderful work and prove the great advance in civilization in the last century. The development of sight-saving classes is the next forward step.

If by our combined efforts we can further a plan by means of which certain handicapped individuals may acquire an education and select a vocation as nearly along normal lines as possible, it will be well worth while.

Editors' Note.—This paper is an extract of an article printed in the Illinois Medical Journal, August, 1933, with a specially prepared introduction by Miss Hayden, of the Illinois Society for the Prevention of Blindness.

Eye Examinations in a Zinc Ore Industry*

R. H. Seip

EXAMINATION of the eyes of 1,265 employees in a zinc ore plant disclosed that more than 17 per cent suffered from seriously defective vision

THE work in which we are engaged is the mining and milling of zinc ore.† The class of labor includes all nationalities: Americans, Irish, Polish, Lithuanians, Russians, Mexicans, Chileans, and so on. In 1931, the first of a series of periodic physical examinations of all employees was conducted by the company surgeon. The total number of employees examined was 1,265. The statistics of this survey showed that 17.1 per cent of the total number examined had some considerable degree of defective vision. Vision was not recorded as defective unless the defect was greater than 20/40 in one or both eyes. A large percentage of those with defective vision had never had any correction. Others had had correction, but did not have their glasses with them at the time of the physical examination. Others who had had correction indicated that a change in correction was needed.

One of the purposes of this physical survey was to extend helpful advice to such employees whose physical condition could be improved. To carry out this purpose in part, and to give advice of a helpful nature along some specific line involving a good percentage of employees, the matter of defective vision was given first consideration.

The first step in this direction was to have the visual acuity tests, which were made by the company surgeon, checked by a competent medical eye specialist. Two hundred employees, or

* Presented at the Greater New York Safety Conference, New York City, during the session on "The Eye."

† The New Jersey Zinc Company.

about the 17.1 per cent that I mentioned above, were included in this check survey. The results in each individual case were scrutinized by the specialist to determine whether a complete ophthalmological examination was warranted. It was found that such an examination was indicated as advisable in 118 of the 200 cases. Each of the 200 employees examined in the check survey was notified, in a letter from the superintendent, of the findings of his particular examination, including a report on the nature of the defect in each eye. These defects were listed as none, slight, moderate, or serious, rather than by the use of the visual acuity fractions.

Employees whose visual tests indicated the advisability of further examination with a view to correction were advised to have such examination made. No recommendation was made as to whom they should consult for such examination, except that they were urged to consult a competent medical specialist.

To enhance the probability of having such examination made by the employee, arrangements were made with an eminent medical eye specialist whereby the examinations would be made at the plant. This was done to eliminate the loss of time by hourly employees that would ensue if it were necessary for them to go out of town for examination, also to eliminate the cost of transportation and to obtain reasonable minimum cost for a competent specialist's services.

Through the offices of the specialist, a competent dispensing optician agreed to accompany him to the plant to make the necessary measurements for frames, to display the various types of frames, and return to the plant to fit the glasses to the individual.

Information on these tentative arrangements was conveyed to the employees verbally in order to avoid any appearance of pressure or commercialism. Subsequently, many requests for the services of the specialist and optician were made to the Safety Division of the company, which division was instrumental in conducting all examinations. A schedule of appointments was prepared and each person was notified by letter of the date and hour of his appointment.

The company provided the examination room, including a special dark room and special lighting. An assistant was also fur-

nished by the Franklin Hospital. All records were made by a representative of the Safety Division. The schedule provided for 24 examinations in an eight-hour period, and it was found possible to maintain this schedule. Each individual paid his own bill to the doctor and optician, and no finances were handled by the company.

Applications for examinations continued to come in and included many requests from members of the families of employees. The service, therefore, was extended to include members of employees' families and, later, to other residents of the two towns in which the company conducts operations. This last extension, however, was not widely advertised and no effort was made to get business. The primary purpose was to extend a definite service to employees.

Of the 118 employees advised to have complete examinations, 87 accepted this advice. Among the remaining 31 were a large number who already had glasses, but of which fact the company had no previous record. There were several who did not feel their need for glasses was great enough to warrant the expense, while several others claimed they could not afford the expense. As a result of the program, the majority and most serious of the defective vision cases have been checked.

Another phase of the program was that which considered the requirements of employees with extremely defective vision to wear safety goggles continuously while on duty. A visual acuity of 20/200 is considered to be industrial blindness.

A survey of the examination revealed 63 employees with a visual acuity of 20/200 or less in one or both eyes. It was felt that such employees should have adequate protection from industrial injury that might affect the remaining vision. It was determined, therefore, to require such of this group whose duties were in any way hazardous to the eyes to wear safety goggles continuously when on duty.

In cases where prescriptive glasses would correct poor vision, safety goggles with prescriptive lenses were furnished by the company without cost to the employee. Where vision could not be improved by glasses, the use of plain safety goggles was required. Each of the members of this group was given a letter from the superintendent at the time his goggles were delivered to him, with

definite instructions to wear the goggles continuously when on duty.

It may be interesting to note of the 63 cases with vision of 20/200 or less, 31 were supplied with prescriptive goggles; 25 were required to wear plain goggles, and 7 were not required to wear goggles due to the type of work in which they were engaged.

The entire program was carried through with smoothness and with satisfaction to all concerned. Employees with defective vision were enabled to have better vision through expert service at a minimum cost. The company benefited through this fact and through the accumulation of records showing the actual condition of the eyes of each employee. This is important in the medico-legal side of defective vision in compensation cases in which the previous condition of the eye or the vision was not known. It has been possible also to furnish adequate protection to those employees with extremely defective vision.

Editorials

Prenatal Care for Syphilitic Mothers to Conserve Vision

TO THE layman it may seem at first thought to be an expensive and uncalled-for procedure to advocate the examination of every pregnant woman for syphilis at the beginning of her pregnancy, in order to assure early treatment of those who are found infected. But experience and statistics abundantly prove its value. Furthermore, it ought to be part of a general health examination; in which case this becomes only one of the many benefits of thorough medical knowledge of every woman who is about to go through the period of pregnancy and childbirth. In other ways, information on the functioning of the body—for example, the blood, the heart, the kidneys, the nervous and digestive systems, the sex organs and the various glands—is quite as important to both mother and child.

In a way, the advocacy of a blood examination for every pregnant woman—provided it is followed promptly by effective treatment when evidence of syphilis is found—is as practical a preventive measure in sight conservation as is the required practice now so generally observed of putting standard silver nitrate drops into the eyes of all newborn babies to prevent ophthalmia neonatorum. In twenty-five years mankind has benefited enormously from this procedure. As a single illustration, institutions for the blind show a reduction from more than twenty-six per cent to less than seven per cent of inmates blind from this cause. Aside from the happiness and usefulness of those whose sight has been conserved, many millions of dollars have been saved for the taxpayers. It is within the power of the people and the physicians to make an even greater saving in healthy sighted children and parents by a quarter of a century of unremitting effort to conquer congenital syphilis.

At the recent annual meetings of the American Medical Association and the Conference of State and Provincial Health Authorities of North America, the resolutions reported in this number of the SIGHT-SAVING REVIEW were adopted, calling for united efforts

to secure for every pregnant woman adequate examination, including tests for syphilis, and early treatment for all showing infection.

It is significant of the steady evolution of the art of medicine toward the full inclusion of preventive as well as curative practice that these two great professional groups have adopted resolutions calling for nation-wide participation of all agencies and individuals in a position to help in promoting popular understanding and application of modern knowledge to the reduction of congenital syphilis. Public confidence and participation will also be promoted by the evidence of close and friendly co-operation between professional and voluntary agencies which these resolutions show. The two national agencies specifically mentioned in the resolution of the American Medical Association—the National Society for the Prevention of Blindness and the American Social Hygiene Association—have worked together toward this end for many years. It is a matter of great satisfaction that the opportunity is now afforded for joining in a broader program.

WILLIAM F. SNOW, M.D.

School Eye Clinics

Parents are slow to recognize any need for glasses for their children. If the child does not observe something at a distance which the parents do, it is ascribed to lack of observation, or inattention. If the book is held too close, or writing is accompanied by frowning or twisting the face, it is assumed that the child has fallen into "a bad habit." Certain it is, that the presence of some eye defect is usually recognized by the teacher before such a thought has occurred to the mother. If children's eyes suffer from neglect, school authorities must give them some attention. Failure of parents to attend to the child's needs has called for laws compelling school attendance and for truant officers. The same kind of neglect in the field of health has to be met by a school clinic.

There are many children who come to school, handicapped for school work by defective eyes. With such eyes they cannot get the full benefit of the common school. They cannot keep up with their classmates. Necessarily they become conscious of inferiority, without knowing why it is, or that any one else is to blame for it.

They fail of promotion, drop back to a lower class, become "retarded" children, have to repeat the year's work, and are a source of increased expense to the school district. Aside from doing justice to such children, the community cannot afford this increased expense; or allow the child's deficiencies to become a permanent charge to be met by the public.

The school eye clinic is not a means for helping paupers but for preventing pauperism. It should not be associated with clinics for the medical relief for the poor. It may well be held in one of the schools, or in a school administration building. It is a "health examination," but quite different from an inspection for signs of contagious diseases, and it is less generally understood than the search for impaired nutrition, or early tuberculosis.

The school clinic cannot provide for all children entering school. Those who need its care will generally have to be selected by teachers, principals, school nurses, school physicians, and sometimes parents. Often such children will be found by a testing of vision, which should be made of every child admitted to the schools. Among the children thus assembled, a very large proportion will need glasses. But every child should be looked over for evidence of other defects—congenital or results of diseases acquired during infancy and early childhood. Although the child may not be sent because of poor vision, his vision should be tested.

The complete success of the school clinic requires that the defects found in the eyes shall be removed or remedied, so far as possible. Those who establish or control such a clinic should plan how to meet the needs of the individual child and to remove his handicap for school work. In many towns there are competent opticians who can supply the glasses needed; and can fit to the face the frames that will keep them properly before the eyes. The naming of such a person to parents and children—one who can be relied on to fill the prescription and fit serviceable frames at a reasonable price—will be a real service to the clinic and the community. Arrangements should also include whenever possible, furnishing at a reduced price or without charge, the glasses for children who otherwise could not obtain this needed help.

If the school clinic is really a free service to the children, in most communities will be found individuals who can and will help by

giving needed glasses to those children, who otherwise would be compelled to do without them. Even in scattered communities there are children who cannot gain the benefit of the common school without correcting glasses.

The follow-up of the refraction of school children may be expected to be a means of gathering real information about the changes that occur in the eyes during the years of growth and development. It is reasonable to make sure that the eyes are able to do what is expected of them as often as it is customary to test whether the child has learned enough to be advanced a grade in the school system. But, with freedom from symptoms, many children can go several years without change of glasses. Certain children, however, should be seen every year, or even more frequently.

The higher grades in school are likely to need better sight than the lower. Those who may need more help should be warned of certain symptoms that are likely to arise. All who require the special methods of sight-saving classes should be seen every few months.

EDWARD JACKSON, M.D.

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request.

Non-Shatterable Glass in Spectacles

Many oculists have seen serious injury to eyes from broken glass of automobiles, and this hazard has become so well recognized, even by the laity, that now all the better class of automobile manufacturers put non-shatterable glass in the windshields, and, in fact, use nothing but this type of glass throughout their cars. In the past month or more, three states have enacted legislation which provides for the installation of non-shatterable glass in all motor vehicles.

For a number of years the value of protective glasses in many industries has been well recognized. On a small scale shatterproof glass has been used in certain especially hazardous work. This glass was made only in plano lenses, and the glass used was not a high grade of optical glass; it was distinctly greenish in color when viewed edgewise. Recently a much improved non-shatterable glass has been put on the market. The glass is of the same clear, colorless type as is used generally in the optical business. The blocks are molded in toric form as for the customary lenses, and can be ground to the proper correction, within certain limitations, so as to correct the error of refraction. When mounted in frames this glass can not be distinguished from the usual lenses.

An objection frequently raised by parents, when glasses are advised for their children, is the possibility of breakage and the

danger of broken fragments of glass entering the eye and doing it serious damage, or even destroying sight. The same danger is recognized when glasses are worn by older children and adults in their various sports as well as in work.

The advantage of such glasses will readily be appreciated for myopic children, where it is so important to get them away from books and interested in outdoor life and various types of sport. Parents of such children have been especially fearful of having them wear glasses under such conditions because of the danger involved.

The slight extra expense in substituting this type of glass for ordinary lenses might well be looked upon as a small insurance investment. The writer has found many parents delighted with the opportunity of securing this extra safety for their children. We have accordingly been using them more and more frequently for the past year or two, and with complete satisfaction in every respect.

Not a few adults also are glad to avail themselves of this extra security, especially those who have been so unfortunate as to have lost one eye from an accident.

I believe, therefore, that it is well worth while to draw the attention of the readers of the SIGHT-SAVING REVIEW, lay or professional, to this new extra safeguard to vision.

WILLIAM EVANS BRUNER, M.D., Cleveland, Ohio.

Eyes and Athletics

Every boy interested in athletics realizes how important his eyes are for the enjoyment of games, whether in playing or in watching. It is not only his sturdy arm but his steady eye, as well, that makes Babe Ruth the "Home Run King." And every person who goes to see a lively baseball game certainly needs good eyesight to get the full benefit of that powerful swing of the bat which has made George Herman Ruth so famous. Bobby Jones, Bill Tilden, and the other champions of sport also owe much of their success to healthy eyes.

Each year, all over the United States, when the school term begins, school boys have their eyes tested. It may seem surprising that one out of every eight school children having their eyes tested is found to have defective eyesight. But almost all defective vision can be corrected if proper care is taken. That is why it is so im-

portant to follow the instructions of the school teacher and school nurse. Though glasses are prescribed, the wearer can take part in athletics. Only a very few school children are found who, because of very poor eyesight, require special care and cannot play the regular outdoor games and take gymnasium work with the class.

Many accidents to the eyes occur during outdoor play. Did you ever play "cat?" In crowded streets accidents have occurred when the little stick flew into the face of some innocent bystander, sometimes actually blinding him. Playing cowboys and Indians is a lot of fun, too. But sometimes boys play with guns and the shot has been known to blind one of the playmates. Every Fourth of July many serious accidents occur; some result in blindness. The danger of firecrackers is considered so great that many cities have laws prohibiting their sale.

Not only must we take care of our eyes at playtime, but also during our reading and study hours. If special care or glasses have been advised, instructions should be followed. Glasses are prescribed to be worn and not to be kept in the desk. Many baseball heroes wear glasses; special guards are now provided for eyeglasses worn in athletics.

Nowadays, every effort is made to plan new school buildings so that they are properly lighted and to have books with the right kind of paper and the correct size of type, so that our eyes may not be unnecessarily tired. The following are good rules to apply at home, as well as at school. They apply to everybody—boys and girls and men and women:

Read with a clear, good light falling from above over your left shoulder.

Hold your book about fourteen inches from your eyes.

Always read with your head up.

Keep your books clean; a soiled page is hard to read.

Avoid books printed indistinctly, in small type, or on glossy paper.

Rest your eyes frequently.

If your eyes ache, or if you have trouble seeing things distinctly, report it to your teacher or your parents who should have your eyes examined.

Note and Comment

American Social Hygiene Association Joins in Program of Sight-Saving Through Prenatal Care for Syphilitic Mothers.—In its progressive program of saving sight the National Society again participates with the American Social Hygiene Association in an intensive program to secure for every pregnant woman adequate examinations, including tests for syphilis, and early treatment for all showing infection. The importance of preventing syphilitic keratitis and other eye involvements of congenital syphilis by treating the mother's infection during the early prenatal life of the child has long been realized by public health leaders. At the recent International Ophthalmological Congress, in Madrid, Spain, it was the subject of active discussion; and Dr. Park Lewis, vice-president of the National Society, presented the American point of view. Returning to the United States, Dr. Lewis conferred with many other ophthalmologists and officers of the Society and of the Social Hygiene Association, and the joint project was begun.

Correspondence with the section chairmen of the American Medical Association, and the Conference of State and Provincial Health Authorities of North America, and officers of other professional bodies elicited the fact that there was general agreement upon the timeliness and practicability of such concerted action. Accordingly resolutions were passed by all these agencies at their annual meetings, the substance of which is well expressed in the following general resolution, adopted June 15, 1933, by the House of Delegates of the American Medical Association:

"WHEREAS, Prenatal syphilis is responsible for interstitial keratitis and for many uveal and neural changes resulting in defective sight and blindness as well as deafness and other defects, and

"WHEREAS, It has been found that above 3 per cent of the women attending prenatal clinics—in certain studies as high as 30 per cent—have shown a positive reaction to the Wassermann test, and it has been estimated on the basis of group studies that from 3 to 5 per cent of children taken in the mass have prenatal syphilis and that about half of these children without adequate

treatment develop interstitial keratitis leading to defective vision if not blindness, and

"WHEREAS, It has been authoritatively stated that prenatal syphilis can, without doubt, be prevented in the majority of cases, but only if there is complete co-operation between the patient and the various medical, social and educational agencies which enter into the diagnosis, the treatment and the care of the infected pregnant woman; and that if treated adequately in the child before organic changes have occurred, it is curable without loss of sight, and

"WHEREAS, This deplorable condition can be controlled only by combined efforts of the medical, the social and public health authorities; therefore be it

"*Resolved*, That the Section on Ophthalmology requests the House of Delegates of the American Medical Association to appoint a committee to take this subject under advisement and to arrange methods by which co-operation may be secured through the combined efforts of the American Medical Association, the National Society for the Prevention of Blindness, the American Social Hygiene Association, the obstetric and ophthalmologic societies, the American Dermatological Association, public health organizations and such other organizations as can help, in order that blood examinations may be made of all pregnant women so that methods may be arranged for the treatment of all those infected with syphilis, thereby preventing the blindness and other tragedies which would otherwise inevitably follow."

Dr. Edward Stieren moved that the resolution be adopted. The motion was seconded by Drs. Emily D. Barringer, New York, and G. Henry Mundt, Illinois, and carried, after Dr. Frank W. Cregor, Section on Dermatology and Syphilology, had stated that a similar, identical resolution was unanimously adopted by that section.

In addition to the Sections on Ophthalmology and Dermatology and Syphilology, the Section on Nervous and Mental Diseases, and the Section on Preventive and Industrial Medicine and Public Health, passed resolutions of similar purport. The chairmen of the Sections on Pediatrics, and Obstetrics, Gynecology and Abdominal Surgery approved the proposal. As voiced in the motion of the preventive medicine section, the purpose of all these resolutions

was to "show how generally the medical profession is concerned with the co-operation of all agencies in solving this public health and welfare problem."

National Eye Service Functioning in England.—The National Ophthalmic Treatment Board in England, which has been organized recently for the eye care of persons of limited means, describes its services in a series of leaflets sent to industrial organizations, state-insured persons and others eligible for such treatment. Emphasis is put upon the fact that eyes are part of the body and, as such, require the care of trained medical men. It has already been found that this type of eye care will materially aid health in England.

Can Business Afford to Let Up on Safety?—During the coming period of economic adjustment, safety practices and safety education are more than ever necessary. Safety not only reduces the insurance overhead: it also discovers, at the source, items of waste and converts them into items of plant efficiency. In one plant it was found that a thoroughgoing safety program saved $150,000 a year. Furthermore, with the prospect of speeding up production and employing new men, safety devices and regulations must be increased to prevent future accidents.

District of Columbia to Have Sight-Saving Classes.—The Congress of the United States has authorized the establishment of sight conservation classes in Washington, and has appropriated the funds to inaugurate this special type of education. This brings the District of Columbia into line with the fourteen states of the Union that have made possible education for those with serious visual impairment.

Henry Dickson Bruns.—The National Society for the Prevention of Blindness regretfully makes note of the death of Dr. Henry Dickson Bruns, emeritus professor of diseases of the eye, New Orleans Polyclinic, and member of the National Society's advisory committee; his fifty years of service in ophthalmology were recently commemorated by the erection of a bronze plaque in the Eye, Ear, Nose and Throat Hospital in New Orleans.

Junior Red Cross Spreads Sight Conservation in India.—Because there are at least one million blind persons in India, and three times that number afflicted with acute visual impairment, the Indian Red Cross is undertaking to educate the public in causes and prevention of the common eye diseases. Two brochures have been published and are being distributed to school children; the material is fully illustrated and popularly written for both children and adults. One of the pamphlets forms a program of action and demonstrates how Juniors may help those about them to safeguard their sight.

New Code Stimulates Better School Lighting.—An electric company in Michigan has undertaken to put into the hands of all school superintendents in its district a copy of the recently revised "Standards of School Lighting." When the changes are explained in terms of the present school lighting equipment, it is felt, and has already been noted, that a greater interest and comprehension of problems involved in school lighting will result in action to bring schools up to the standards outlined.

Industrial Eye Accidents in England.—Every year nearly 7,000 men in Great Britain's industries sustain eye injuries of more or less serious nature. It is computed that some 4,800 eye injuries involved a seven-day absence from work, or more, while, for 4,300, the average absence was four weeks. Nearly all of these accidents could be avoided, according to a brief article in *Industrial Welfare* (London) for May, if the proper protective devices—goggles with non-shatterable lenses and machine guards—were used and the use enforced. The Committee on the Causes and Prevention of Blindness refutes the erroneous idea that goggles are in any way injurious to the sight, and suggests that specifications for goggles to be worn at hazardous types of work in mines and in the engineering and metal trades be drawn up by the Home Office. Only through the fullest co-operation of directors and workers can this great toll of eye accidents with its frequent result of vision impairment and even blindness be reduced.

A Century of Progress in Optics.—Taking advantage of the nation-wide interest in the Century of Progress being celebrated at the World's Fair in Chicago, the *Optical Journal and Review of*

Optometry devoted its June 15 issue to a special review of the past century's progress in optical art. This issue is of great value for its tracing of optical history and preservation of the names of those who made possible modern methods of better seeing through lenses.

West Virginia Considers Its Visually Handicapped Children.—Although West Virginia has taken no action in the care of its blind and visually handicapped citizens beyond the establishment of two small schools for the blind, a state-wide survey of the situation, prepared for the West Virginia White House Conference on Child Health and Protection by Dr. J. E. Blaydes, should result in a fuller program of education and care for blind and partially sighted children. Dr. Blaydes urges the creation of a commission for the blind whose duties it would be to prepare and maintain a state register of the blind, to adopt measures for the prevention of blindness, and to conduct educational campaigns to promote interest in work for the blind and semi-sighted and in the prevention and cure of blindness. Special reference is made to the need for establishing sight-saving classes in cities, and offering to rural children the opportunities for such special education where it is needed.

Cuban National Association for the Prevention of Blindness.—Aided by the efforts of the Cuban Ophthalmological Society, a national organization for the prevention of blindness has been formed in Cuba. Dr. Manuel Anton, who has long been interested in the possibility of preventive work in his country, has been chosen the president of the new movement.

Hereditary Blindness—A Challenge.—Ophthalmia neonatorum was the cause of blindness in eighteen per cent of the pupils enrolled at Perkins Institute in 1888; today, this cause of blindness has been reduced to less than one half of one per cent in that school for the blind, and a similar tendency to decrease is seen in all parts of the civilized world where prophylactic practice has been established. Foremost of the present causes of blindness are those diseases which are inherited: atrophy of the optic nerve and congenital cataracts. What steps may be taken to eliminate or diminish this cause of blindness?

The Prevention of Blindness Committee of the Union of Counties Associations for the Blind, in its recent report on *Hereditary Blindness*, finds that, notwithstanding the feeling which is prevalent that blindness from inherited diseases is an important contributing factor in total blindness, the limited field of research into family history makes it impossible to gather accurate figures on hereditary blindness and eye disease. They recommend that in certification of blindness, records of eye diseases in previous generations be compiled. Of undoubted importance in the inheritance of eye diseases leading to blindness are retinitis pigmentosa and hereditary optic atrophy. Certainly, blind persons should not contemplate having children without medical sanction, and those in whose families blindness has occurred should face the fact that it may have been a hereditary trait. The record sheet accompanying the Union report should be of particular interest to students of genetics and everyone interested in the prevention of so important a cause of blindness.

Community Health—A Demonstration.—The sixth annual report of Bellevue-Yorkville Health Demonstration illustrates graphically how a fully rounded health service may utilize its own resources and those of co-operating agencies for better health and greater health consciousness in a neighborhood or community. Not only prenatal, baby and preschool clinics function, but a tuberculosis clinic, a mental hygiene service, and a health education project have given the community an intensive health service, as well as a demonstration for other urban health centers.

Visual Fatigue of Motion Pictures.—A comprehensive selection of opinion upon the visual fatigue from attendance at motion pictures has recently been published by the Amusement Age Publishing Company, New York. Not only are American opinions quoted, but a representative bibliography of world-wide observers of motion picture technique has been assembled.

Windowless Schools May Protect Eyesight.—Talking to the conference course on economics in school administration at the New York University School of Education, D. W. Atwater, illu-

minating engineer, declared that aside from the loss of outside view a windowless school would contribute to lower construction costs, more efficient heating and air conditions, and a lighting system which would give constant, dependable light. While the value of good illumination in factories and other work places has been measurable in dollars and cents, the value of good illumination during the formative years of childhood is inestimable.

Dr. Luedde Receives Leslie Dana Medal.—The Leslie Dana Gold Medal, awarded annually for the most outstanding achievements in the prevention of blindness and the conservation of vision, was presented this year to Dr. William H. Luedde, director of the department of ophthalmology in the St. Louis University School of Medicine. The medal is one of the most highly prized marks of recognition in the entire public health field. Dr. Luedde was selected for this honor by the National Society for the Prevention of Blindness, in co-operation with the Missouri Association for the Blind, through whom the medal is offered annually by Mr. Leslie Dana of St. Louis. The conditions of the award set forth that it is to be made for "long meritorious service for the conservation of vision in the prevention and cure of diseases dangerous to eyesight; research and instruction in ophthalmology and allied subjects; social service for the control of eye diseases; and special discoveries in the domain of general science or medicine of exceptional importance in conservation of vision." Lewis H. Carris, managing director of the National Society, made the presentation.

Psychogenic Blindness.—The case of a miner who suffered loss of sight after witnessing an accident in a mine illustrates the possibility of blindness, not from disease or physical impairment, but from psychological causes. Since there is no physical reason for the loss of sight, there is a tendency on the part of outsiders to refuse to accept the actuality of blindness. A recognition of the dark and mysterious realm of the subconscious makes this type of case susceptible to cure, while the scoffing attitude and lack of sympathy which such a condition often calls forth among the ignorant and unthinking results only in a persistence of the neurosis.

Handicap Prevention.—The theory that an ounce of prevention is worth a pound of cure has been universally accepted but seldom practiced, says Lewis H. Carris, managing director of the National Society for the Prevention of Blindness, in the July issue of *Rehabilitation Review*. Accidents leading to the need of rehabilitation need not occur, since it has been estimated that only two per cent of industrial accidents are unavoidable. The program for the prevention of disabling disease must spread not only to the avoidance of the disease itself, but into the health standards and health opportunities of every section and group of the population. Those who must work with the maimed and damaged members of our present society must recognize the prior necessity of prevention of such handicaps.

Eye Clinics Travel in Poland.—A broad step in preventing blindness was the organization last year of the two traveling eye clinics which, from May to September, covered the rural sections of Poland, treating cases of trachoma. Figures from the Wilno committee of the Polish Red Cross show that in the first year 65,894 consultations were given. The staff examined 13,337 school children, among whom were found 852 cases of trachoma. By making available to rural districts the urban facilities of the clinic, many trachoma victims will have their sight conserved.

American Optical Company Celebrates Centenary.—At its exhibit at Chicago's Century of Progress, the American Optical Company celebrates its own one-hundredth birthday. The company's intimate understanding of the human eye and of its refractive requirements has fostered the development of goggles for the protection of the eye from industrial hazards of flying sparks and metals, intense heat and injurious acids. The company's exhibit of goggles, whose shattered but unbroken lenses bear witness to eyes that have been saved, is most eloquent of the progress of prevention of eye injuries in industry.

National Society Notes.—The National Society announces the addition to its Advisory Committee of Miss Edith M. Baker, director of the Social Service Department at Washington University Clinics and Allied Hospitals, St. Louis, Missouri, and of Miss

Kate McMahon, director of medical social work at Simmons College School of Social Work, Boston, Massachusetts.

The honorary degree of doctor of laws was conferred by Hobart College upon Lewis H. Carris, managing director of the National Society.

Members of the staff of the National Society co-operated with many of the meetings of national health and social organizations. At the annual meeting of the State and Provincial Health Authorities of North America, Mr. Carris was the Society's representative. In collaboration with Dr. William Campbell Posey, he presented a paper on "The National Society for the Prevention of Blindness," before the meeting of the section on ophthalmology of the American Medical Association, at its annual meeting in Milwaukee. He also was present at the meeting of the Committee on the Handicapped Child, during the National Conference of Social Work, where he spoke on "The Importance of Handicap Prevention." Others attending the Conference were Miss Eleanor P. Brown, secretary, and Miss C. Edith Kerby, statistician. At the invitation of the Illinois Society for the Prevention of Blindness, Mr. Carris spoke at the Century of Progress on aspects of sight conservation.

The training courses for teachers of sight-saving classes were visited by staff members of the Society; Mrs. Winifred Hathaway, associate director, spent six weeks as special lecturer at the course given at Teachers College, Columbia University, and also lectured at the University of Chicago; Mr. Carris talked to the class for training sight-saving class teachers at Teachers College, Buffalo, New York.

At the International Congress on the Education of the Deaf, Miss Mary Emma Smith, R.N., director of nursing activities, spoke on "Sight Conservation in Schools for the Deaf."

In co-operation with the New York State Department of Labor, a series of radio talks was given over Station WNYC on various aspects of eye protection in industry.

Programs for autumn meetings include the annual meeting of the National Safety Council, Chicago, October 2–6, at which Mr. Carris will act as chairman of the session on "The Eye and Its Relation to Safety"; annual meeting of the National Rehabilita-

tion Association, Chicago, October 10, at which Mr. Carris will speak on "Co-ordination of Activities"; and the meeting of the American Public Health Association, Indianapolis, October 8–12, during which Mr. Carris will participate in discussing "Is There a Common Objective in Public Health Education Around Which All Health Organizations Can Rally?"

Book Reviews

ALLERGY AND IMMUNITY IN OPHTHALMOLOGY. Alan C. Woods, M.D. Baltimore: Johns Hopkins Press, 1933. 166 p.

A third of a century ago in his classic work on "Immunity" Metchnikoff laid down certain principles upon the specific reaction of the tissue cells to various substances. These have formed the basis of a vast number of experimental studies since that time. It was a method, as he then declared, which had so largely contributed to the prevention of disease and in which such great advances had been made under the inspiration of the discoveries and ideas of Pasteur, that medicine had become an exact science.

Metchnikoff was a research biologist, not a clinician, and while the advances have been unexpectedly great in the department of immunity, medicine cannot yet be considered an exact science. It has indeed, however, been largely redeemed from empiricism by laboratory studies, and in consequence the whole structure of modern preventive measures has come to occupy an essential and increasing degree of importance.

Roux had then already demonstrated that if the earliest cells of the frog embryo are artificially separated, susceptibility under the influence of chemotaxis plays an important rôle. The prolongations of the nerve cells direct themselves toward the organs of sense or toward the muscular fibers as guided by specific susceptibility. The mother cells are so controlled when they go toward a newly formed tissue, or when they approach one another, or come together in order to form a vascular loupe. It is the modification of this susceptibility when the cell is acted upon by certain extrinsic substances that has led to our modern knowledge of allergic reaction and immunity. In 1914 Szily, in a monograph, gathered together the scattered observations on anaphylactic effects on the eye. Much of value has been added since then. Woods' volume is the first important one on this subject in English and is especially opportune. The work is arranged in seven chapters in which the subject is systemically developed.

The author tells us that to comprehend the participation of the

eye in the immune reactions of the organism it is necessary to understand the general problem of resistance, of infection, of hypersensitiveness, anaphylaxis, allergy and immunity. These are briefly described, thereby enabling those who are not familiar with the developments in this field to follow intelligently the researches that have been more recently made. Following Zinnser, he defines antigens as a class of substances which, administered to the animal body in a manner excluding their digestive disintegration, give rise to specific alteration in the reactive capacity of the treated cells. "Experimentally it is seen that the eye is sensitized as a part of a general sensitization, the tissues of the body are likewise affected by the antigen absorbed directly by the eyes; the tissues of the eyes are capable of inflammatory reactions which appear to be purely anaphylactic in character." The work that has been done on immune-body formation in the various structures is reviewed and briefly summarized.

Interesting chapters are those on allergy and focal infections, on allergic conjunctivitis, upon the antigenic property of lens protein and uveal pigment concerning which the author's work is very well known, on syphilis, on tuberculosis and on foods, with a concluding chapter on the new specific therapy.

This is a book which every forward looking physician will wish to possess and read. The entire subject is still in process of development. Much more will be learned concerning cell reactions during the next few years and to keep pace with this progress it will be necessary to be informed on all such new work as is given to us.

There are a few slips of the pen such as speaking of Marquez as a South American, and some typographical errors, but the volume as a whole is a distinct addition to the literature of modern ophthalmology. It has a charming preface by Prof. Wilmer and is dedicated to the memory of the author's father, Dr. Hiram Woods, who was a founder and ardent supporter of the National Society for the Prevention of Blindness. The work is well documented, well bound and of convenient size to be easily held while reading.

PARK LEWIS, M.D.

THE RÔLE OF EYE MOVEMENTS IN READING WITH AN EVALUATION OF TECHNIQUES FOR THEIR IMPROVEMENT. Francis P. Robinson, Ph.D. Iowa City: University of Iowa Studies, No. 39, University of Iowa, 1933. 52 p.

Reading disabilities among college students are now receiving serious consideration by both research workers and administrative officials. It is generally agreed that reading proficiency may be improved to a certain degree provided the reader is adequately motivated. Practical means for at least partially relieving the impediment of slow reading and poor comprehension are now available at many colleges and universities in "how to study" courses and reading clinics.

In this monograph the author's purpose was to "evaluate the rôle of eye-movement habits in determining reading ability." The subjects of the investigation were retarded readers at the University of Iowa Reading Clinic. One experimental group was trained to improve comprehension, another to improve speed of reading, and members of a third group served as controls. On the second test the controls showed no improvement, those trained in comprehension made marked gains in comprehension, and those trained for speed made significant gains in rate and some improvement in comprehension. The author describes his training to improve speed of reading as "eye-movement pacing," and says "that such training improved eye-movement habits, which in turn increased reading efficiency."

The inference that "pacing" the eye movements results in more efficient oculomotor performance which produces improved reading performance cannot be accepted as valid. Practically all investigations bearing on the subject show that oculomotor habits are extremely flexible and therefore promptly adjust themselves to any change in reading proficiency. Furthermore, it has been convincingly demonstrated that any confusion or marked change in perceptual processes are readily reflected in modified eye-movement performance. It would appear that eye movements are merely symptoms rather than causes of reading status. Remedial training with no reference to eye movements is highly successful. In fact, the measurement of eye movements may be omitted in the clinic without lessening the efficiency of reading diagnosis or of remedial training.

This monograph is a sound and worthwhile contribution to the psychology of reading as far as experimental results are concerned. The author has shown that reading may be improved by specific methods of training. However, his inference that "pacing eye movements" results in more efficient oculomotor habits, and that these in turn produce improved reading proficiency is not adequately supported by his own results or by other findings.

MILES A. TINKER, Ph.D.

CLINICAL PHYSIOLOGY OF THE EYE. Francis Heed Adler, M.A., M.D., F.A.C.S. New York: The Macmillan Company, 1933. 406 p.

The correlation of ocular physiology and clinical ophthalmology is a very necessary step in the development of the ophthalmologist. It often happens that young men beginning to study for the specialty request advice on works on the physiology of the eye. Heretofore it has been very difficult to make suggestions which would supply the need. Dr. Adler's fine work on the *Clinical Physiology of the Eye* supplies this defect in the literature. A number of works are available containing sections on ocular physiology and there are a number of elaborate treatises on physiological optics. These works are difficult reading even for the matured ophthalmologist and are extremely difficult for the beginner to interpret in terms which can be applied directly to his practice. *Clinical Physiology of the Eye* is written in clear straightforward English, avoiding all stilted and complex forms of presentation; in fact, the style is so attractive as to sustain interest, and one is carried through the various phases of metabolism of the eye, the physiology of vision and the physico-chemical processes associated with the perception of light, without being aware that he is passing through a very intricate maize with a minimum of mental exertion. The author's numerous contributions to ophthalmic literature have demonstrated beyond question his fitness to present a work of this kind and make one feel confidence in the opinions he expresses. His selection of material for a book on clinical physiology of the eye has indeed been very appropriate and very well developed both as a text and a reference book.

JOHN N. EVANS, M.D.

EYE, EAR, NOSE AND THROAT FOR NURSES. Jay G. Roberts, Ph.G., M.D., F.A.C.S. Philadelphia: F. A. Davis Company, 1931. 213 p. Ill.

As a conviction after twenty years of work in a special field Dr. Roberts states in the Preface that "in no department has the nurse's education been so neglected as in diseases and surgery of the Eye, Ear, Nose and Throat." *Eye, Ear, Nose and Throat for Nurses* is offered as one means of overcoming this deficiency in the nurse's training.

In the Introduction, usual procedures in general and special surgery of eye, ear, nose and throat are contrasted. Logical arguments are advanced in support of the recommendations for preparation, technique, treatment and care in the special field.

Significant is the first paragraph of the opening chapter: "Upon no one faculty is the human race so dependent for happiness and a useful life, as good sight, yet there is perhaps no organ of the body more neglected, abused and misused through ignorance, indifference and neglect, than the eyes. It becomes the duty of the nurse, as in other lines of public health, to educate the public in the care and conservation of this important function."

This is followed by an outline of the development of the eye, its care from infancy to maturity, and a detailed discussion of anatomy, physiology and diseases of the eye. Emotional reactions to eye surgery are presented sympathetically. Drugs, their effects, and treatment of unfavorable reactions, are emphasized appropriately. A list of "don'ts" comprises one chapter. The negative form is resorted to, in all probability, for emphasis and immediate results. Concluding features are a glossary and index.

As a text, or reference, *Eye, Ear, Nose and Throat for Nurses* is an acceptable addition to literature in this field. It is written in a clear, concise, convincing manner, and generously supplemented with illustrations. Its physical make-up contributes to ease and efficiency in reading. The author's approach is particularly significant in that it recognizes the psychological and public health aspects of the special diseases under discussion.

LULA P. DILWORTH, R.N.

Contributors to This Issue

Dr. Luther C. Peter, professor of ophthalmology at the Graduate School of Medicine, University of Pennsylvania, interprets for the layman his thorough knowledge of eye disease.

Dr. Percy W. Cobb is associate professor of applied biophysics in ophthalmology at the School of Medicine, Washington University, St. Louis.

In addition to being ophthalmologist on the staff of the New York Eye and Ear Infirmary, **Dr. Conrad Berens** has devoted much time to the problems of the Lighthouse Clinic for the Prevention of Blindness and the Eye Clinic of the Seamen's Church Institute.

Dr. A. L. Adams is the attending ophthalmologist of the Illinois School for the Blind. **Miss Audrey M. Hayden** is executive secretary of the Illinois Society for the Prevention of Blindness.

Mr. R. H. Seip's position as chief of the safety division of the New Jersey Zinc Company gives him an opportunity to carry out a well-rounded eye protection program.

General director of the American Social Hygiene Association, **Dr. William F. Snow,** again joins with the National Society for the Prevention of Blindness in a campaign to prevent congenital blindness.

Dr. Edward Jackson, emeritus professor of ophthalmology at the University of Colorado, is consulting editor of the American Journal of Ophthalmology.

Among the book reviewers: **Dr. Park Lewis,** vice-president of the National Society, needs no introduction to REVIEW readers; **Dr. Miles A. Tinker** is assistant professor of psychology at the University of Minnesota; **Dr. John N. Evans** is director of research at the Brooklyn Eye and Ear Hospital; **Miss Lula P. Dilworth, R.N.,** is assistant in health education in the Bureau of Public Instruction, New Jersey.